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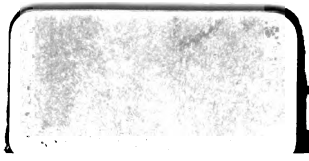

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1824 Frederick C. Skey, Esq., F.R.S., *Assistant Surgeon to St. Bartholomew's Hospital; Surgeon to the Northern Dispensary; and Lecturer on Anatomy and Surgery at the Aldersgate-street Medical School; Grosvenor-street.*

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1841 Johann Müller, M.D., *Professor of Anatomy and Physiology; Director of the Royal Anatomical Museum; Berlin.*

J. C. Oersted, M.D., *Professor of Physics in the University of Copenhagen, &c. &c.*

Professor Orfila, *Dean of Faculty, and Physician to the King of the French, &c., &c.; Paris.*

1841 Bartolomeo Panizza, M.D., *Pavia.*

1843 Philibert Joseph Roux, *Member of the French Institute; Surgeon in Chief of the Hôtel Dieu; Professor in the Faculty of Medicine; Paris.*

C. J. Temminck, *Director of the Museum of Natural History of the King of Holland; Amsterdam.*

Friedrich Tiedemann, M.D., *Professor of Anatomy and Physiology; Heidelberg.*

Giacomo Tommasini, M.D., *Parma.*

1841 John Warren, M.D., *Professor of Surgery in the Haward University, Boston, Massachusetts.*

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CASE

OF

PARALYSIS,

WITHOUT LOSS OF SENSATION,

FROM DISEASE OF THE CERVICAL MEDULLA.

By JOHN WEBSTER, M.D.,

CONSULTING PHYSICIAN TO ST. GEORGE'S AND ST. JAMES'S DISPENSARY, ETC.

READ NOVEMBER 8TH, 1842.

CONSIDERABLE attention has recently been directed by medical practitioners to affections of the nervous system, especially since the physiological experiments and discoveries of the late Sir Charles Bell were made known to the profession. Besides the investigations of that celebrated anatomist, Dr. Marshall Hall, Mr. John Shaw, M. Foville, Sig. Bellingeri, and other physiologists, have by their labours thrown so much light upon these important subjects, that many hitherto intricate questions connected with the functions and diseases of nerves are now much better understood, and are more successfully treated than previously. Nevertheless, believing that any additional facts respecting inquiries of

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the above description will prove acceptable to the Fellows of this learned Society, I am induced to bring under their notice the following history of an interesting case of disease in the cervical medulla, occurring in a gentleman, a patient of mine, who died in July last, after suffering from an illness of several years continuance; and as an opportunity was then afforded of ascertaining the actual pathological changes of structure, by which the symptoms characterising the patient's malady during life were produced, the present narrative is consequently more complete, than it would have been otherwise.

This individual, although he was for many months totally unable to move, even in the slightest degree, any muscle situated lower, than the neck, still retained the capability of feeling, quite perfect throughout the entire surface of the body; whilst the other senses and intellectual faculties remained unimpaired to the last moment of his existence. Indeed, the patient's cuticular sensibility continued not only unaffected, but it even appeared, in the latter stages of the case, to be more acute than natural; at the same time, that all power of effecting voluntary motion was entirely suspended in the trunk and extremities. This inability of making the slightest movement was so remarkable, that a bystander, ignorant of the patient's real condition, might have readily believed, from merely looking at him as he lay upon a couch, without noticing the movements of the head or countenance, that the inanimate body then before him was a corpse, rather than a

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human being, endowed with mental faculties the same as in health, and possessing feelings even more acute than ordinary.

History.—W. H. G., Esq., æt. 36. Before describing the symptoms characterising the disease affecting this gentleman, it should be mentioned that he was endued with a strong muscular frame, was able to undergo a great deal of bodily exertion without fatigue; and, until a few years before his death, had usually enjoyed excellent health, excepting that he suffered occasionally from severe headaches, which were, however, generally relieved by active purging. It is also of importance to mention, that this patient always perspired very freely in warm weather, or even after much exercise in cold; nevertheless, from the commencement of his protracted illness, and throughout its continuance, the cuticular secretion became very scanty, and latterly it was entirely suppressed.

In the year 1836, Mr. G., whose health had hitherto been excellent, was annoyed for some months by a phagedenic ulcer on the left leg, from which he suffered much pain and inconvenience; and although the sore afterwards got well, a similar ulceration on the leg again broke out in 1838, when it was followed, in the same year, by a large chronic ulcer on the posterior part of the pharynx. It is right however to state, that this local affection did not appear to be of a syphilitic character, and the patient, I was assured, never had any complaint of that nature. The ulceration in

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the throat continued for some time without undergoing much alteration in appearance; until, both from it, and from the sore leg, the patient's constitution was considerably deteriorated; and as Mr. G. afterwards met with a severe domestic affliction, he also suffered much from mental depression.

Towards the end of autumn in 1839, Mr. G. again began to suffer materially in health; he now complained of almost constant pains in the head, which occasionally became so severe, as even to oblige him to stop in the street, and to lean against the rails for support. These symptoms were also frequently accompanied by sickness and considerable prostration of strength; the bowels being generally costive, the tongue much furred, and the appetite at the same time impaired. In January 1840, slight epileptic attacks now supervened, which were attended with an exceedingly slow pulse, varying generally from 35 to 40 in a minute. From this distressing state, Mr. G., however, recovered so much, as to be able to leave home about the end of February, and soon afterwards to resume, in some degree, his ordinary professional avocations.

In the following March, notwithstanding the above improvement, he was again attacked by several epileptic fits, but of a much more marked character than any of those noticed previously. These convulsive seizures occurred repeatedly; and after some weeks, they were followed by severe

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spasmodic contractions of the lower extremities, which often became so violent, that both knees were thereby forcibly drawn up towards the epigastrium, when the patient's legs would be again suddenly extended to their full length; and although the sufferer appeared perfectly cognizant of their occurrence, and often felt acute pain at the time, he was nevertheless quite unable to control any of these vehement involuntary movements of the extremities.

It should likewise be mentioned as a peculiar feature of the disease at this particular period, that often when talking to another person, Mr. G. was unable to finish the sentence he had just commenced, in consequence of an involuntary propensity, which he could not restrain, of repeating many times over some principal word in the phrase he wished to express; or the same difficulty would occur from making use of a word quite different from the one he really wished to employ; and this confusion in the use of words actually happened, without the patient being able to correct himself, although perfectly aware at the moment that he was speaking erroneously. At this period of the disease the pulse felt also very languid, but the circulation was never so slow as it had been during the previous attacks in January.

Subsequently, that is in the summer of 1840, Mr. G. complained of considerable weakness in his back and loins, accompanied with pains of the head, and in the nape of the neck. He soon afterwards

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became unable to walk steadily without support: and, to use the patient's own words, "he felt as if his body were cut in two, and the lower half falling away from the upper." Both hands and arms now became very weak, and were soon nearly powerless; and he also complained of considerable pain about the fourth cervical vertebra, increased in severity on merely bending his head backwards; but this sensation felt however less painful when rotatory motion of the neck was only attempted.

About the end of autumn in 1840, as most of the symptoms had gradually undergone material alleviation, compared with their former severity, the patient seemed now greatly recovered in strength and could walk out occasionally, with only the aid of a staff. Indeed, towards the end of that year, the progress made was so far satisfactory, and the general health apparently so much restored, that Mr. G. was even able to visit his friends and join a little in society. During this temporary amendment, having dined at Kensington, on Christmas day, he was afterwards, in consequence of not meeting with a conveyance, unfortunately obliged to attempt walking to town, during a very cold and frosty night, when the streets were covered with snow. From the great exertions Mr. G. made on this occasion, he soon got so fatigued, that being totally unable to proceed the whole way on foot, he was taken home in a carriage, chilled and completely exhausted.

After this misadventure, all the symptoms from

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which Mr. G. had previously suffered for a long time so peculiarly, again became as marked and severe as before, until the ability of moving any of his limbs got at last so very feeble, that eventually he was entirely deprived of the use of both legs and arms. Ultimately, the muscles of the abdomen and chest were similarly affected, whereby respiration could then be only carried on by the diaphragm; when the patient likewise lost the power of coughing, and was scarcely able to expectorate. The bowels now became even more constipated than before, and in order to act upon them sufficiently, it was necessary to employ very active purgatives, assisted by strong enemata; whilst the bladder required to be frequently emptied by the catheter, during many months consecutively. Notwithstanding the total loss of power over all the muscles situated lower than the neck, the sense of touch still continued as acute as ever throughout the entire frame; indeed, the cuticular surface appeared occasionally to be even more sensible to external impressions than in the patient's previous good health; since he could, for instance, feel most acutely the slightest change in the temperature of the surrounding atmosphere, especially when a current of air passed over any part of his person.

Although the patient appeared, at a subsequent period of his disease, to have acquired a slight degree of control over some of the muscles connected with the shoulder, so as to be then able to move partially that part of his body, such temporary

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power was again soon lost; and ultimately the privation of voluntary motion remained as marked as before, excepting in the head, the features, and the tongue; or in the muscles of deglutition, which were never affected. At the same time that these symptoms prevailed, all the senses continued perfectly normal, the memory appeared unimpaired, the patient had no headache, and his intellectual faculties were as perfect as they had ever been at any former period, although once or twice he seemed to be a little confused or slightly delirious; but this symptom was of such partial duration, that it scarcely deserves observation.

Besides the symptoms already detailed, Mr. G. frequently complained of feeling intense heat over all the body, whilst the surface actually felt cold to a bystander; and at other times he experienced alternations of heat and cold, although his skin appeared to others of the natural temperature. Again, if a foot or even a toe were touched, spasmodic twitchings of the limb, accompanied with pain, were always produced; the patient's sense of feeling being, at the same time, so accurate, that he could distinctly tell the particular point of his body to which the attendant's finger was applied. The circulation still continued languid, and sometimes the pulse was intermitting; whilst the cuticle remained devoid of perspiration, being perfectly dry, and exhibiting quite an opposite condition to that noticed during the patient's previous robust health.

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In the latter months of his illness, Mr. G. often complained of excessive coldness in the epigastrium and stomach, along with considerable distension of the abdomen from flatus, although the trunk of the body and the extremities frequently felt burning hot to the patient at the same moment. At this stage of the disease, the spasmodic twitchings of the legs were not only more frequent than previously, but they sometimes even became so violent as almost to throw the patient off his couch, being also attended with great additional suffering.

Besides these symptoms, it ought to be mentioned that the urine, which at first was very little altered from its healthy condition, now deposited a considerable quantity of a thick ropy sediment, and although this secretion had long been drawn off by the catheter, it now passed involuntarily, and almost in drops; whilst the fæces likewise came away in a similar manner, the evacuations being of a watery consistence, and latterly very offensive.

The appetite and digestion, always much impaired, entirely failed towards the termination of this painful and protracted malady; when frequent nausea, vomiting, singultus and apthæ supervened. Finally, notwithstanding the efforts made to alleviate the afflicted patient's sufferings, all the symptoms continued, with unmitigated severity till the 22nd of July last, when Mr. G. died, quite exhausted; retaining however his intellectual faculties perfect to the last moment of existence.

Treatment.—Respecting the means pursued in

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the alleviation of Mr. G.'s lingering malady, it will suffice to state generally, that having the advantage of being frequently seen by Dr. Chambers, Dr. Seymour, Sir Benjamin Brodie, and Mr. Tatum, who repeatedly met me in consultation, every remedy likely to mitigate the symptoms, when even no hope existed of curing the disease, was had recourse to; but all proved either inefficient, or produced only temporary benefit. Among the remedies employed, purgatives with strong enemata were found to be most beneficial, especially when the latter contained confection of rue. The tincture of cantharides, given as a diuretic, seemed likewise of considerable efficacy, at the same time that leeches were applied near the spot on the nape of the neck, where pain was felt on moving the head backwards; their application being followed by blisters. Subsequently, a constant discharge was maintained from two issues, about four square inches in size, on each side of the spinal column, which were kept open for many months, by a mixture of mercurial and blistering ointments. The drain thus produced was considerable, and at one time it seemed to be rather advantageous; but the relief obtained from it, or indeed from any remedy, was only transitory, and never very decided.

Besides the above plan of treatment, mercury, sarsaparilla, hydriodate of potassa, strychnia, hydrocyanic acid, morphia, and various other medicines, which it would be superfluous to detail, were likewise tried, but without any beneficial or permanent

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result. Respecting one of the remedies just named, it deserves to be noticed as a peculiar feature in the present case, that although mercury was administered internally in very large doses, and rubbed in to an unusual extent, for some months consecutively, whilst both the issues were constantly dressed with mercurial and blistering ointments, this powerful mineral scarcely produced any apparent effect, either upon the patient's mouth, or his system generally.

During the last months of Mr. G.'s existence, notwithstanding the treatment seemed to have very little power over the disease, and although an unfavourable prognosis was for a long time entertained, nevertheless to alleviate the almost tetanic symptoms, to procure sleep, and, if possible, to give temporary ease to the afflicted patient, morphia was frequently administered, and in large doses; indeed, towards the fatal termination of the case, this excellent anodyne was the chief remedy trusted to for relief; and however hopeless of curing the patient, its use certainly diminished the severe sufferings, and tended to soothe the acute pain of his latter moments.

Autopsy.—About eighteen hours after death, the examination was very carefully made by Mr. Hewett, in the presence of Dr. Nairne, Mr. Tatum, Mr. Charles Hawkins, Mr. Powell and myself. From notes made at the time, I have since drawn up the following Report of the pathological appearances met with:—

The body appeared considerably emaciated, but was not discoloured. Having removed the skull

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cap, some effusion of lymph was found under the arachnoid membrane covering the left side of the brain, along with turgescence of that, and the other hemisphere; both divisions being pale, and exhibiting a watery aspect, although their texture was firm and compacted. The ventricles of the brain seemed large, particularly the left; and about two ounces of serum were effused in these cavities; the foramen commune being at the same time larger than natural. The arachnoid tissue extending over the pons Varolii adhered to the parietal layer of that membrane; but no tumour, or any other change of structure was found either in the brain or cerebellum, excepting that the latter organ appeared anemic, and rather softer in texture than ordinary.

On opening the thorax, every part seemed quite healthy, although the pleura pulmonalis on the left side of the chest, adhered firmly to the pleura costalis, by a few strong bands, some of which were apparently of considerable standing. The abdominal viscera likewise appeared very little changed from their natural condition, the liver, stomach and intestines being free from disease: with the exception of the kidneys, which were somewhat enlarged, anemic, and exhibited marks of chronic inflammation on the internal membrane of the pelvis and infundibula. The omentum and some of the small intestines also adhered to the bladder by strong bands, whilst that viscus was much diminished in magnitude, felt very hard to the touch, and on cutting into its cavity, it actually appeared not

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larger than the interior of an ordinary sized walnut, its muscular coat being unusually thickened. The mucous membrane was dark-coloured and rugous on the surface.

Having carefully laid open the vertebral column, throughout its whole length, the theca, corresponding to the three or four lower cervical vertebræ, was found to be much distended; and on being cut into, the arachnoid cavity, with the sub-arachnoid tissue, appeared filled with lymph, which evidently had been some time effused; as the membranes were thereby united to each other, and also to the cord. On making a more minute examination of the parts, the adhesions of the membranes to the cord were discovered to be much firmer at its anterior, than posterior portion; indeed, they were actually so strong, as to be inseparable from the medulla without rupture. At this particular part, the medulla also appeared larger than usual, felt soft and pulpy to the touch, and on being divided by the knife, its substance seemed to be in an almost diffluent state, infiltrated with serum, but exhibiting a natural colour. For the extent of half an inch above the point just described, the cord had a dusky red tinge, appearing however, of the ordinary consistence. In the anterior and posterior columns, not much difference was observable to the naked eye, at the first superficial examination of the diseased part of the medulla; although both divisions of the cord seemed considerably softened, infiltrated and disorganised, particularly in the posterior columns; whilst as well above,

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as below the affected portion, the medulla was healthy, and quite natural in appearance.

Since it is often very difficult by the ordinary means of investigation, to describe accurately all the minute alterations of structure, which disease may induce in so delicate a texture as the spinal cord, the microscope becomes an important auxiliary to scientific anatomists. Indeed, without the aid of that useful instrument, it would in many cases be difficult, if not impossible, to ascertain correctly the actual pathological changes of structure, which have taken place in that organ, so as to be able to explain the phenomena and symptoms characterising cases like the one now under consideration.

Fortunately on the present occasion, such a desideratum has been supplied; as I am enabled to exhibit to the Fellows of the Society, not only the diseased portion of the cord, but likewise to add a minute and valuable account of its microscopical examination, which that able physiologist, Professor Todd, of King's College, has had the kindness to make, for the express purpose of being appended to the present communication. In the letter that gentleman did me the honour to write, after examining the diseased part of the medulla transmitted to him for investigation, he says, "The portion of spinal cord submitted to me by Dr. Webster, appears to consist of the greater part of the cervical segment. I find great destruction (from softening) of the medullary substance of the posterior columns, especially

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that of the right side; the antero-lateral columns seem to have been also the seat of the softening process to a less degree, but I do not find that they have suffered any loss of substance. In examining the softened parts by the microscope, I detected very few of the proper nerve-tubes; and those which I did observe, were much altered from their natural appearance; they had become opaque, and had assumed an indistinctly fibrous aspect. I was unable to find any trace of grey matter. The posterior horns must have shared in the great destruction of the posterior columns, and probably the anterior ones experienced a similar fate. It is right, however, to observe, that the specimen had been preserved some time in spirits, before it came into my hands. I found throughout the diseased part, numerous small scales, (cholesterine?) such as are very commonly met with in portions of the nervous centres preserved in spirits."

Dr. Todd then makes the subsequent very important remarks:—"I consider this case of the greatest physiological interest, as affording unequivocal proof, that the posterior columns cannot perform the office assigned to them by some physiologists, namely, that of conducting sensitive impressions to the brain, or at least, that they are not the only channels of this communication. It is also important in an anatomical point of view, as showing that the posterior roots of the nerves are independent of the posterior columns of the spinal cord; for although the latter were destroyed

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to so great an extent, the former did not appear to have suffered in any degree."

Observations.—This instructive and interesting example of disease of the nervous system excited, as it well might, much attention in all those who witnessed its progress; and they, along with myself, confidently hoped, that the pathological appearances met with on dissection would be such as to explain satisfactorily the rationale of the peculiar symptoms, which the malady exhibited during the patient's protracted and severe sufferings; more especially, in regard to those remarkable features characterising the case, namely, that whilst sensation remained unimpaired, voluntary motion was totally suspended. Because, should these anticipations be realized by the *post mortem* examination, some important pathological facts, worthy of being recorded, would thereby be added to the points already established, as well regarding the actual seat, as likewise the courses of transmission of those functions. The autopsy, with the microscopical inspection of the diseased part of the medullary cord now given, although they sufficiently account for the loss of motion, do not explain why the patient's sensations remained not only unimpaired, but even appeared to be more acute than natural.

Physiologists might undoubtedly urge, since there appeared more indications of inflammation having existed in the anterior than in the posterior columns of the cord, as shown by the firmer adhesions of the membranes to them and to each other, at the

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diseased part of the cervical medulla, such circumstances may be thought by some, sufficient to explain most of the phenomena observed during the patient's life. Nevertheless, in these difficult and often disputed questions respecting the functions and diseases of the nervous system, other physiologists may conclude, and with considerable show of reason, that the loss of motion, so remarkable in this instance, was solely owing to the generally softened condition of the anterior part of the cord, which change in all probability arose from the previous inflammation already mentioned.

Besides these considerations, it is also deserving of notice, that the reddened state of the cord, above the softened portion of that organ, indicated such a degree of irritation in the spinal medulla, as would sufficiently account for the occurrence of those spasmodic actions of the lower extremities noticed in the case, and from which the patient latterly suffered so severely; whilst it is also probable, that had he lived for a longer period of time, the extent of disease in the cervical medulla would have been materially augmented.

As these, with some other interesting points, respecting the nature and seat of affections implicating the nerves, and exhibiting symptoms similar to the case above described, are still surrounded by considerable difficulty, more extensive experience, supported by dissections, is necessary to enable physicians to explain some of the discrepancies in

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opinion yet prevalent among physiologists on these important subjects; I therefore submit this case to the notice of the Society, as an instructive and somewhat rare example of disease of the nervous system, which in my opinion appears worthy of attentive consideration.

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CASE OF

BRONCHIAL CALCULUS,

WITH OBSERVATIONS ON DISEASE OF THE BRONCHIAL GLANDS.

By JOHN CHARLES GRAHAM TICE, M.D.,

ASSISTANT SURGEON 8TH (KING'S) REGT. OF FOOT.

COMMUNICATED BY SIR JAMES M'GRIGOR, BART.

READ JANUARY 10TH, 1843.

MR. JOB ALDRIDGE, quarter-master, 8th (King's) Regiment, quartered in the Royal Barracks, Dublin, ætat. 48, plethoric and of nervous temperament, began, about the 7th September 1842, to complain of pain in the right side, affecting, to a trifling extent, the freedom of respiration.

Pressure over the liver caused great uneasiness. The pulse was natural, tongue furred, bowels constipated, and heat of surface moderate.

He states, that for some time past he has been annoyed, particularly in the morning, with a most disagreeable taste, resembling fried onions.

Suspecting the biliary secretion to be in a vitiated state, and the organ somewhat gorged, calomel, with cathartic extract, was given, followed by infusion of senna and salts. Several dark, offensive stools succeeded; the pain and difficulty of breath-

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ing, however, were rather increased than otherwise. The pulse was fuller, and resisting—sixteen ounces of blood, taken from the arm, produced some relief. The breathing became more free. This treatment was directed, not only with the view of improving the secretions of the liver, but of relieving any congested state of that viscus.

The alteration for the better was of short duration. The pain of liver, the difficult and painful respiration, returned with increased violence, while paroxysms of cough followed each other in rapid succession. Pulse 98, of large volume, but readily yielding to pressure; a thick brown coating on the tongue; heat of surface moderate; bowels acting freely; motions fœtid, of a dark colour; urine plentiful and light. He continued to refer the pain to the liver. Pressing that organ against the diaphragm, caused more acute pain than pressure exercised in any other direction.

The fœtor of breath increased. This, though so distressing to him, is not perceptible by myself. The horizontal posture is now attended by a sense of suffocation.

Blood was again drawn from the arm, and as the difficulty of breathing was thereby but little relieved, 24 leeches were applied over the right hypochondrium. The quantity of blood lost by this mode was so trifling, that a further abstraction of blood by cupping was thought advisable. He could now bear much greater pressure, but the cough and dyspnœa remained unaltered.

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Calomel, squills and the tartrate of antimony were given in small but repeated doses, and a blister was placed over the region of the liver.

The cough and dyspnœa continued increasing in severity, and the only position in which he could remain with anything like ease, was leaning forwards, holding both knees.

In consequence of the alarming state of the patient, I requested Dr. Peile, deputy inspector-general, to see him, who, from the nature of the symptoms, suspected that effusion had taken place, causing, by the gravitation of the fluid, that distressing sense of suffocation which invariably occurred in lying down.

Percussion elicited no morbid sound, and auscultation proved the lungs on both sides to be in a healthy condition, as also the heart.

The patient on this occasion stated, that about three weeks prior to his illness he had partaken of a pear, and while part of it was passing down the œsophagus, he experienced a sense of soreness, and thought it remained in his chest.

He pointed to a spot, a short distance below the clavicle, and a little to the left of the sternum. He added, that from that day up to the present, whatever he has swallowed, liquid or solid, appears to him not to pass beyond that spot.

It was soon after the above event that he first noticed the fœtor of his breath, which he represents, at times, as most intolerable.

The active treatment which had been pursued

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failed in alleviating the symptoms. The cough not only became more frequent, but the paroxysms of longer duration; the dyspnœa, on resuming the recumbent posture, more alarming, added to which, the patient now complained, at intervals, of a sense of syncope.

The system was, at this time, under the influence of mercury. At this period of the case, (October 8th,) Dr. Wm. Stokes was called in, and this gentleman, after a most careful examination of the chest, pronounced the lungs and heart to be healthy.

He considered the disease as depending chiefly upon nervous and spasmodic irritation of the respiratory organs, and advised expectorants and sedatives. Up to this period the cough had been hard and almost unattended by expectoration, which, however, became shortly afterwards abundant, and consisted chiefly of glairy viscid mucus.

Soon after the first interview with Dr. Stokes, the breathing became stridulous, the cough laryngeal, succeeding, in paroxysms, each full inspiration. The patient was unable to remain, even for the shortest time, in the horizontal position, without a most distressing sense of choking.

There was the same, or even increased fœtor of the breath. Notwithstanding these urgent symptoms, there was but little acceleration in the pulse or alteration in the temperature of the body. The urine was copious and natural, and the bowels free. Between the thyroid and cricoid cartilages the air passed as if over a roughened surface. The sound

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on percussion over the larynx was remarkably dull. The voice at intervals was somewhat hoarse. No indication of disease existed in the lungs, or morbid appearances on inspecting the pharynx. On the 11th October it was suspected that laryngitis had set in. The treatment now consisted in the external application of leeches and extract of belladonna, also calomel, tartar emetic and sedatives taken internally.

No relief followed. On the contrary, the symptoms augmented in violence. Having passed a most distressing night, he was seized on the morning of the 18th October with a severe fit of coughing, which was at length subdued by help of an anodyne mixture; soon after taking which, he fell into a disturbed sleep.

At this period I was summoned to see the patient.

I found the stridulous breathing replaced by mucous *rôle*; a total absence of vesicular expansion in the right side, and so obscured in the left, as scarcely to be heard. He was comatose, and in about half an hour after my arrival, after a deep inspiration, he suddenly expired.

Six weeks had elapsed since the commencement of the illness.

Post-mortem Examination thirty hours after death. —Little or no rigidity of the limbs; the muscles well developed and adipose tissue very abundant.

A small inguinal hernia of the left side, which first became apparent about four years ago.

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The removal of the sternum was difficult, in consequence of the ossification of the cartilages of the ribs. The right lung was a little gorged with blood and rather dark-coloured, but it was free from adhesions, and in other respects perfectly healthy. On raising it and dividing its attachments, the knife suddenly entered a *cavity*, of the size of a pullet's egg, from which a most offensive odour was emitted. This cavity was formed by an abscess in a mass of enlarged bronchial glands, situated at the bifurcation of the trachea. It opened into the right bronchus, ulceration having destroyed a large portion of that tube. The inferior margin of the ulcerated opening was thickened and elevated: on the other side, the abscess communicated with the left bronchus, by an aperture of about half an inch in diameter, having inverted and thickened edges. Posteriorly, the abscess had made its way into the œsophagus by ulceration. The opening into that canal was capable of admitting a large-sized bougie. The abscess contained a quantity of calcareous matter, some very hard, some of a soft consistence. The whole, when first examined, was of a dark melanotic aspect. A triangular portion of the hard calculous matter had firmly wedged itself into the aperture communicating with the right bronchus.

The mucous membrane in both tubes (above the ulceration) was marked by a deep blush, which extended nearly as high as the thyroid cartilage. A small ulcer was discovered towards the inner edge

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of the descending cornua of the thyroid cartilage on the right side.

The left lung was in a state of congestion like the right, but otherwise healthy. The heart was small but normal.

The liver was large and gorged with dark blood, but no traces of inflammation in it were discoverable.

The other portions of the abdominal viscera were not examined.

A portion of the calcareous mass taken out of the right bronchus was analysed by Dr. Burton, and found to consist of phosphate of lime.*

The foregoing case offers much matter for reflection. The real seat of disease was certainly not known, nor even suspected, during life, but, nevertheless, some points had been diagnosticated, which dissection fully verified. Auscultation had pointed out the healthy condition of the heart and of the lungs.

Percussion of the chest had dispelled the apprehension, at one period entertained, of effusion into the cavity of the pleura.

Laryngitis had been very clearly distinguished, as soon as the stridulous breathing and the hoarseness were added to the spasmodic cough.

Deep-seated dysphagia certainly did exist, and ought perhaps to have attracted more attention, but

* A preparation of the diseased mass was made, which is deposited in the Museum of the Medical Department of the Army at Chatham.

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the peculiar nature and extreme rarity of this case, may well plead in extenuation of the diagnostic error committed.

It is scarcely possible to conceive a case wherein the appearances on dissection more satisfactorily explain the whole course of the phenomena during life. It is evident that the moment the fœtor was noticed by the patient the abscess had opened into one, or probably into both, bronchial tubes. The sense of suffocation attending the recumbent position no doubt arose from the pressure of the large tumour upon the trachea, and probably by a portion of the calcareous mass slipping occasionally into the right bronchus, the aperture of which was so much larger than that of the left bronchial tube.

The sudden extinction of life may be accounted for by the calculus found wedged in the right bronchus, added to the partial obliteration of the left.

Spasmodic closure of the glottis was probably the last in the series of phenomena.

The observations of authors on the diseases of the bronchial glands, and of the cellular tissue in which they are imbedded, are few, and not characterized by great accuracy. Dr. Baillie's "Morbid Anatomy" is silent on this portion of pathology.

Laennec (chap. 9) remarks, that "inflammation of the bronchial glands is very little known, and appears very rare." He adds, that "Cretaceous matter and tubercle are the two kinds of accidental productions observed in these glands. The

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former is sometimes found quite dry and hard, but more commonly so soft that it may be forced out by pressure." "When cretaceous matter is formed, it is rare," he says, " to find the whole structure of the gland involved. It occupies the centre of the gland." He has seldom met with abscess in the bronchial glands, nor has he ever seen the disease in them assume the character of bone. He further remarks, that " tuberculous disease of this structure is frequently found without accompanying tubercles of the lungs, or marks of any severe affection of that organ."

Dr. Stokes remarks, (page 303,) that " disease of the bronchial glandular structure has not obtained separate investigation. Yet from recorded cases, we may conclude that these glands, when hypertrophied or otherwise diseased, seldom produce any striking symptoms."

Dr. Stokes proceeds to observe, that " according to Andral, tumours of the bronchial glands frequently cause tracheal and bronchial compression. I have never myself," he adds, " met with any instance of stridulous breathing, or even bronchial compression, produced by this disease."

Berton, who, according to Dr. Stokes, is the latest writer on the subject, dwells strongly on the fact that the bronchial glands may be greatly hypertrophied, without causing compression of the blood-vessels and air-tubes.

A case is recorded by Andral, where an enormous

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mass of melanosis compressed the right bronchus so as to diminish its diameter by one half. There was here no stridulous breathing, the signs being a feeble respiration in one lung, with intense puerility in the other.

My own reading has not furnished me with any case resembling the present.

At all events, there can be no question, that such an occurrence as calculus of the bronchial glands finding its way into the bronchus by ulceration, and suddenly destroying life, is extremely rare.

The case is interesting, too, on another account.

Disease of the bronchial glands, was in this instance, uncomplicated with disease either of the lungs, or of any other important viscus. The character of the symptoms, therefore, attending this singular variety of thoracic disease is here very unequivocally manifested.

The diagnosis of bronchial disease will probably be always attended with difficulties. Stethoscopic investigations may, as in the case now recorded, afford indirectly much assistance, but our surest and most efficient guide will be found in careful reflection on the nature and succession of the symptoms.

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ON

CONGESTIVE PNEUMONIA,

CONSEQUENT UPON SURGICAL OPERATIONS, DISEASES AND INJURIES.

By JOHN E. ERICHSEN, Esq.

READ JANUARY 24TH, 1843.

NOTWITHSTANDING the care with which the diseases of the lungs have, of late years, been studied, there is one form of inflammation of these organs that has escaped, with but few exceptions,* the notice of writers on this subject; but which, from the frequency of its occurrence, and the latent and insidious character of its symptoms, peculiarly de-

* The only writer, with whose works I am acquainted, that enters to any length upon this subject is Sir C. Bell; who in his "Surgical Observations," devotes a "Report" to its consideration. Guthrie, in his Treatise on Gunshot Wounds, speaks of Pneumonia as a cause of death after operations, more particularly secondary amputations. Dr. Forbes, in his translation of Laennec's work on the Diseases of the Chest, mentions the subject in a note, and Dr. C. J. B. Williams, in the article "Pneumonia," Library of Practical Medicine, alludes to it as a variety of that disease.

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serves the attention of the surgeon. I mean that variety of Pneumonia, which occurs in connection with, or as a consequence of, surgical operations and injuries, and which is not dependent upon the absorption of pus.

In a Table* appended to this paper, will be found an account of the condition of the lungs in sixty-two cases of death after surgical operations and injuries. Before proceeding to the analysis of this, it may be necessary, in order to avoid all misconception, to point out those circumstances that have been considered to serve as distinctive signs between Pneumonia, properly so called, and mere passive congestion of the lungs.

The anatomical characters of the first stage of inflammation of the lungs, more especially when that disease assumes an asthenic type, are in all respects similar to those of mere passive congestion of those organs. The lungs, in both cases, being heavy from sanguineous engorgement, presenting externally a livid violet hue, mottled with spots of a dark red, or purple colour, and preserving the impression of the finger, as if œdematous. When pressed upon, they will be found to be more compact and solid than natural, scarcely crepitating. When cut into, a frothy, spumous, reddish fluid

* I may mention that the cases contained in this Table have been calculated indiscriminately, and not selected, from the records of University College Hospital, that very many of them fell under my own observation, and that all deaths occasioned by burns, which are attended by peculiar lesions, have been omitted.

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exudes in considerable quantity, and the pulmonary tissue will, at the same time, be found to be altered in its consistence, breaking down readily under even moderate pressure of the finger into a grumous pulpy mass. This friability of the tissue of the lung has been, by many, supposed only to occur in those congestions of that organ which were of an inflammatory nature, but it has been proved by the observations of Andral, and others, to be of no value as a diagnostic mark in distinguishing these from the mechanical engorgement that frequently supervenes but a few hours before death, and which, when it occurs, is probably the immediate cause of that fatal event. In order, therefore, to avoid all source of fallacy by confounding together these two conditions, that so closely resemble one another in their anatomical character, though differing so materially in their essential nature, I have comprised under the term Pneumonia, only those cases in which either one lung alone was affected, or else, in which some other possible sign of inflammatory action was manifested in the cavity of the thorax beyond a merely congested or softened condition of these organs, such as solidification of their tissue, whether hepatization or splenization of it, the effusion of recent lymph or serum into the pleural sacs, or marked evidences of inflammation of the bronchial mucous membrane.

In accordance, then, with this distinction, between an inflammatory and merely congested condition of the lungs, between an active and passive hyperemy

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of their tissue, the sixty-two cases in the Table will be found to arrange themselves into four classes.

1st.—Those in which there were evident signs of Pneumonia, as evinced either by the diseased condition being confined to one lung, by its having advanced to solidification, or by the co-existence of marks of inflammatory action in the pleuræ or bronchial mucous membrane. These cases are twenty-eight in number, or nearly one-half of the total amount of deaths.

2nd.—Doubtful cases—in which the lungs presented the characters that are common to the first stage of Pneumonia and to passive congestion, without there being any collateral circumstances by which the diagnosis could be more clearly established. These are eleven in number.

3rd.—Cases in which the lungs were found more or less diseased, but not inflamed or congested. These are nine in number.

4th.—Cases in which the lungs were found healthy. These are fourteen in number.*

Thus it will be seen that on examining the lungs of sixty-two individuals who had died from various surgical diseases, operations and injuries, there were found marked evidences of Pneumonia in twenty-eight, or forty-five and one-tenth per cent. of the whole. Of the remainder, it was doubtful in eleven whether the congestion that was met with was of an inflammatory

* It is probable that cadaveric congestion of the lungs may have existed in many of the cases in this class, but as no actual disease was found, they are entered as being healthy.

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or passive character. In nine others, the lungs were more or less diseased, being tuberculous in three cases, bronchitic in four, œdematous in one, and gorged with fluid blood in another; and in fourteen cases only, or little less than a quarter of the total amount—22·5 per cent.—were these organs healthy.

Of the twenty-eight cases in which Pneumonia was found, that disease had advanced to its second stage, that of solidification, in seventeen. The lungs, in the eleven remaining instances, exhibiting the pathological characters of the first stage of Pneumonia, together with evidences of bronchitis, or of pleuritis, as shown by the inflamed condition of the bronchial mucous membrane, and by the effusion of recent lymph, or of serum, into the cavities of the pleuræ. There is one remarkable circumstance connected with the form of Pneumonia now under consideration; namely, the relative frequency of the occurrence of the disease in one or other lung, or in both, at the same time. Andral, Chomel, Forbes, and all pathologists, agree that in ordinary sthenic idiopathic Pneumonia, the right lung is most frequently affected, the left next, and, lastly, both organs conjointly. Now, on examining the twenty-eight cases already mentioned, it will be found that the right lung alone was affected but three times, the left lung alone also only three times, and both lungs together,—not, however, to the same degree,—in no less than twenty-two cases. The reason of this remarkable deviation from the

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law, that appears to govern the occurrence of sthenic idiopathic Pneumonia, may be explained by the peculiar nature of the causes that predispose to and excite the congestive variety of the disease.

In two cases only were the upper lobes found inflamed. One of these was that of a child, who died of phthisis, with intercurrent Pneumonia; the other, that of an old woman, who had been operated on for strangulated hernia. In one case there was found lobular hepatization, the subject being a child twelve years of age, who died with phlegmonous erysipelas of the arm.

That form of inflammation of the lungs which occurs as a consequence of surgical operations and injuries is occasionally of a sthenic, but much more frequently of an asthenic or congestive character, corresponding to the variety of the disease that has received, from various authors, the names of putrid, malignant, congestive, erysipelatous, asthenic, typhoid, and hypostatic Pneumonia, and which is not an unusual sequela of continued fever, and of other affections, attended by much debility of the system generally, or by a vitiated condition of the fluids. I am unable to give the precise ratio of the comparative frequency of the occurrence of these two forms of the disease, the sthenic and the congestive; but I can state that the latter is by very much the most common, being found in by far the larger proportion of those who die of Pneumonia in the surgical wards of a hospital; the disease assuming but occasionally an active character, and that only

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in the young and robust, in whom the powers of the system have not been lowered by a long residence in a hospital, or by the depressing effects of irritative fever and profuse discharges.

The essential nature of this congestive form of inflammation of the lung that occurs in surgical cases appears to be the same as that of the so-called typhoid Pneumonia, which has been proved by the observations of Dr. C. J. B. Williams, and of Dr. Hudson, to be essentially a Pneumonia, complicated by a superadded passive congestion. The blood, in this disease, stagnates in the lungs, under the influence of certain causes, and a degree of irritation being at the same time set up, some inflammatory action is excited in the already congested part, which, however, is of a passive type, not being characterized by the formation of those secondary products that are the usual consequences of active, sthenic inflammation. This stagnation of the blood in particular organs is attributed by Dr. Williams either to an altered condition of that fluid, or of the affected capillaries, or of both.

On examining the condition of the system induced by the irritative fever, consequent upon operations and injuries, more particularly when the subjects of them have been depressed by profuse discharges, or by the vitiated air of hospitals, and who have thus been rendered peculiarly liable to the occurrence of congestive Pneumonia, we shall find that it very closely resembles that state of depression in which the typhoid form of the disease is apt to supervene.

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The anatomical characters of the two forms of Pneumonia are also identical, the lungs being in both cases, in the first stage, of a livid violet, or purple mottled colour, heavy, compact but friable, readily breaking down into a grumous pulp, and scarcely crepitating when pressed upon, but exuding a very considerable quantity of thin, spumous, frothy fluid. When the disease has advanced to the second stage, the tissue of the organ is more dense, but still very friable; it does not crepitate, but sinks in water, and when cut into, the sides of the incision will be found to present a smooth, uniform, black aspect, not mottled, as in the sthenic form of the disease, but presenting those characters that Dr. Williams has described as being peculiar to "Intervesicular" Pneumonia, and which MM. Hourmann and Déchambre have shown to be very common in that variety of the disease which occurs in the aged. On examining the cut surface attentively, we shall find that this smooth, dark aspect, presented by the sides of the incision, is attributable to a highly gorged state of the capillary network of the lungs compressing the air-cells, which are not, as in the sthenic form of the disease, filled with a viscid secretion, but are either empty, or else contain, at most, a thin serous fluid, that appears to have exuded from the surrounding congested and inflamed tissues.

On inquiring into the causes that give rise to congestive Pneumonia, it will be found that, independently of those circumstances that occasion idio-

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pathic sthenic inflammation of the lungs, such as exposure to cold, wet, &c., there are a set of causes that peculiarly dispose to the occurrence of this disease, after surgical operations and injuries. These are divisible into two classes, both of which, however, must concur for the production of the variety of the disease now under consideration.

1st. In the first class are comprised those causes that act mechanically, by giving rise to a congestive condition of the posterior part of the lungs, as the recumbent position long continued.

2nd. In the second class, those that act by diminishing the functional activity of the nervous system, as profuse suppuration, long confinement in hospitals, and irritative fevers, more particularly when assuming a typhoid type, and when occurring in individuals advanced in life.

Age may also perhaps exercise some little influence on the production of congestive Pneumonia, which would probably be more marked than it is, were it possible to separate the few cases of sthenic from those of the congestive form of the disease. On taking, however, the aggregate of the two varieties of Pneumonia, it will be found that the average age of the patients in whom inflammation of the lungs was found, was . . . . . 44·2 years.
Of the doubtful cases . . . . . 39·4 —
Of the cases in which no inflammation or congestion of those organs occurred . . . . . 35·9 —
So that the average difference in age between those

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cases in which Pneumonia occurred, and those in which it did not, amounted to 8·3 years.

That the recumbent position, even when long continued, is not of itself sufficient, in an otherwise healthy person, to give rise to a congested state of the posterior part of the lungs, is evident, as we do not find this effect produced in those who preserve this posture, as in some modes of treatment for spinal distortion, for months, and even years. It is, therefore, necessary that the depressing causes of disease that have already been enumerated should co-operate with it, in order to give rise to congestion, even in so vascular and spongy an organ as the lung; and this we find to be the case. If we take the period that the patients mentioned in the Table lived in the hospital, as equivalent to the time that they maintained the recumbent posture, which, from the nature of the operations and injuries under which they suffered, in most of the cases, we are justified in doing, we shall find, as will immediately be shown, that those who died of Pneumonia preserved this position, on an average, for a much longer period than any others, except the phthisical patients.

Although the circumstances that have just been mentioned tend, to a certain degree, to expose the patient to the occurrence of congestive Pneumonia, yet, without doubt, the most active agent in the production of this disease is a diminution in the functional activity of the nervous system, whether this be the consequence of the irritation of opera-

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tions and injuries, of long-continued and profuse discharges, or of confinement in the comparatively impure air of hospitals,—all of which depressing influences are, in most cases, in action at the same time. That these circumstances operate in predisposing to the occurrence of the disease under consideration, may be seen by examining the Table appended to this paper, by which it will be found that all those who died of this affection had been the subjects of such operations or injuries as are necessarily followed, either by much irritative fever, or by very profuse and wasting suppuration; whereas those in whom the lungs were found healthy, died, with but one exception, before there was time either for suppuration to have taken place or for irritative fever to have been set up.

That a long residence in a hospital, in conjunction with other depressing causes of disease, and the maintenance of the recumbent position, will tend to dispose to the occurrence of congestive inflammation of the lungs, may be seen by the annexed Table,* on examining which it will be found that of the twenty-eight cases of Pneumonia, only one died before the fourth day; whereas, of the thirteen cases in which the lungs were found healthy, no less than eleven died before that period—before, indeed, any inflammatory condition of these organs

* In the second class of cases, a note of the length of time the patients lived in hospital was kept only in ten, and in the fourth class in thirteen cases, instead of in eleven and fourteen respectively.

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could be expected to have manifested itself; and of these eleven, no less than eight died on the first day, or, in fact, were brought to the hospital moribund. Of the remaining two cases, one died on the fifth day, and the other on the forty-fourth day, after being operated upon for strangulated inguinal hernia, a remarkable exception to the rest of the series.

TABLE SHOWING THE LENGTH OF TIME THAT ACCIDENTAL PATIENTS LIVED IN HOSPITAL, ETC.

When Patient died.	1st Class. Cases of Pneumonia.	2nd Class. Doubtful Cases.	3rd Class. Lungs diseased.	4th Class. Lungs healthy.
1st day.	0	1	1	8
2nd do.	0	1	1	0
3rd do.	1	0	2	3
4th do.	5	1	0	0
5th do.	2	2	0	1
6th do.	1	0	0	0
2nd week.	9	1	1	0
3rd do.	0	2	0	0
4th do.	2	1	1	0
5th do.	2	1	1	0
6th do.	2	0	0	0
7th do.	1	0	0	1
8th do.	0	0	1	0
9th do.	2	0	0	0
11th do.	0	0	1	0
14th do.	1	0	0	0
TOTAL .	28	10	9	13

The average time, then, that the patients lived after admission into the hospital was as follows:—

Cases in which the lungs were inflamed . 20·7 days.
Doubtful cases . . . . . 12·3 —
Cases in which the lungs were found diseased, but not inflamed . . . . 22·7 —
Cases in which the lungs were healthy . 1·6 —

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The reason of the high average of the time that those patients lived in whom the lungs were found diseased, but not inflamed, is, that of ten in that class, three died of phthisis on the thirtieth, fifty-fourth, and seventieth day respectively, after admission into the hospital. If these cases are excepted, we shall find that the remainder lived, on an average, only 8·4 days.

It would be occupying too much of the Society's time, were I to enter, at any length, upon a rationale of the operation of those causes that occasion a congested state of the lungs by lowering the energies of the nervous system. It can, however, easily be understood how the lungs, having once become engorged, a degree of inflammatory action, which, from the condition of the patient, must necessarily be of a low type, may be set up in an organ already disposed to its occurrence by the existence of an anormal quantity of blood in its vessels, more particularly in patients who have been rendered highly irritable by traumatic fever and profuse discharges.

The occurrence of congestive Pneumonia in a patient already suffering from the depressing effects of a severe injury or operation, is, of course, a complication greatly to be dreaded, and one which it has been shown is much more frequent than is usually believed. It is a complication against which it is necessary to guard as strictly as possible, both on account of the extreme danger that usually attends it, as well as on account of the disease assuming, in many instances, a latent character, the rational symptoms

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being usually in a great measure, and sometimes in its earlier stages entirely, wanting; and its presence being only ascertainable, with certainty, by a carefully-conducted physical examination of the chest; which, as it is the posterior part of the lungs that are always affected, it is exceedingly difficult, in the majority of cases, to institute; it being obviously impossible to place a patient suffering from the effects of a severe injury or capital operation, in such a posture as to enable the posterior part of his chest to be examined by the ear. When, however, this can be done, the usual physical signs that occur in typhoid Pneumonia will be found in this variety of the disease, namely, absence of the respiratory murmur, dullness on percussion, with sibilous, and large mucous rhonchus, and bronchial respiration. The crepitation being either entirely absent, or, when present, existing but for a short space of time, being, as Dr. Hudson observes with regard to typhoid Pneumonia, quickly lost by an accumulation of blood in the surrounding vessels compressing the air-cells.

As the symptoms of congestive Pneumonia are frequently rendered latent by the low condition of the patient, or masked by the existence of some severe injury that chiefly attracts the surgeon's attention, it behoves him to watch, with the utmost care, any appearance, however slight, of the supervention of a chest affection. He must not wait for the marked symptoms of active acute Pneumonia to show themselves; but if the breathing be at all

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hurried and shallow, if there be any dyspnœa, lividity of the lips, and occasional short hacking cough, with thirst, increased heat of skin, and rapidity of the pulse, he should immediately be on his guard, and, if possible, examine the chest with the ear, in order to ascertain if there be any of the well-marked and easily-recognized signs of Pneumonia present, and if so, to have recourse to as active and prompt measures as the circumstances of the case will admit of.

As this form of Pneumonia has usually existed for some time before the surgeon's attention is directed to it on account of the obscurity of its early symptoms, it becomes exceedingly difficult to determine the precise period at which the disease commences. In some instances, it is probable that death supervenes very rapidly on its occurrence; but in other cases, more particularly when solidification of the tissue of the lung has taken place, which happened in seventeen out of the twenty-eight cases of the first class, it must have existed for a considerably longer period, as time is required for those changes to take place, however imperfectly, that constitute the second stage of Pneumonia.

On the subject of treatment I have but a few words to add. If the views that have been taken, in this paper, of the causes of that form of Pneumonia which occurs after surgical operations and injuries, be correct, it will be more consistent with a rational therapeia to aim at remedying that condi-

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tion of the nervous system which has been the immediate cause of the diseased state of the lungs, and to prevent the congestion of these organs from increasing, by changing the position of the patient, when practicable, from the recumbent to the sitting posture, than to direct our efforts immediately to these organs themselves. With this object in view, the energies of the nervous system should be supported and increased by such stimuli and tonics as the patient may be able to bear; as, for instance, carbonate of ammonia, decoction of senega, quinine, and, in extreme cases of depression, wine and brandy. The inflammatory condition of the lungs should, at the same time, be combated by means of calomel, combined with minute doses of opium, and by counter-irritation in the form of dry-cupping, blistering, stimulating embrocations, or turpentine epithems. Blood-letting in any form, whether general or local, is not only contra-indicated by the already enfeebled condition of the patient, but would, to say the least, be perfectly useless; for we might, as Dr. Williams justly observes in speaking of typhoid Pneumonia, stop the action of the heart by this means before we could unload the congested condition of the lungs. This remark applies, if possible, with more force to the treatment of the surgical form of the disease, as the patient has, before the supervention of the pulmonary affection, already been, in most instances, much lowered by profuse discharges and irritative fever. Upon the whole, however, the curative treatment of this form of

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Pneumonia is but little satisfactory, the best-directed efforts being but seldom crowned with success.

The prophylactic measures that must be had recourse to, in order to prevent the occurrence of the disease in question, are obvious. Patients who have suffered much from the consequences of capital operations and severe injuries, or who are worn out by irritative fever and profuse discharges, should be placed in a room or ward that is as freely ventilated as possible, care being, however, taken to prevent draughts of cold air from playing upon them; they should be warmly clothed, so as to promote, as much as possible, the freedom of the circulation, and all depressing causes of disease must be carefully removed. The supine position should also be occasionally changed for the lateral one, or, if the patient have sufficient strength, he may be seated partly upright. And I may take this opportunity of stating, that the starched or dextrinated bandage, the immovable apparatus, as it is called, may here be of most essential service, by enabling the surgeon to place patients, with injuries of the lower limbs, in such a position, and in such an atmosphere, as shall remove two of the most active predisposing causes of the form of Pneumonia now under consideration, namely, the recumbent position, and the comparatively impure air of a hospital-ward or sick-room.

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A TABLE showing the State of the Lungs in 62 Cases of Death from Operations, Injuries, and Surgical Diseases.

Name.	Age.	Nature of the Case.	When Autopsy made.	State of the Lungs.	Date of the Death.
			Hours.		
J. W.	—	Indolent ulcer of leg.	—	Hepatization of lower lobe of left lung.	12th Day.
W. C.	45	Wound of thumb; inflammation of the absorbents of the left arm.	20	Pneumonia of the posterior inferior lobes of both lungs in the first and second stages.	4th
W. H.	38	Fracture of 5th and 6th cervical vertebræ.	—	Pneumonia of the inferior part of the right lung in the first and second stages.	8th
J. B.	68	Strangulated inguinal hernia; left side; operation.	—	Pneumonia in the first stage of the upper two-thirds of the right lung, with hepatization of the lower third; pneumonia in the first stage of the lower third of the left lung.	23rd
C. C.	17	Laceration of scalp; fracture of skull; injury of brain.	26½	Pneumonia in the first stage of the lower third of the left lung; hepatization of the lower two-thirds of the right lung.	4th
J. T.	40	Blow on abdomen; rupture of ilium; peritonitis.	20	Pneumonia in the first stage of the posterior inferior part of both lungs, but chiefly the right.	5th
W. P.	67	Fracture of the base of the skull; injury of the brain.	30	Hepatization of the posterior inferior part of both lungs, but chiefly of the right.	4th
H. G.	30	Extensive laceration of the scalp; comminuted fracture of the left arm.	38	Pneumonia of the inferior part of both lungs in the first and second stages.	26th
J. D.	57	Fracture of right femur; apoplexy.	40	Pneumonia of the inferior part of both lungs in the first stage, but chiefly the right.	35th
J. F.	34	Contusion of right leg; inflammation of absorbents.	27	Hepatization of posterior inferior part of both lungs.	31st
J. N.	46	Compound fracture of the right leg; amputation.	30	Pneumonia in first stage of the inferior posterior part of both lungs, but chiefly the left.	11th
L. T.	18	Disease of right knee; amputation.	24	Upper lobes of both lungs tubercular; lower lobes, pneumonia in first stage.	56th
R. T.	12	Phlegmonous erysipelas of the left arm.	30	Hepatization of posterior inferior part of both lungs; lobular hepatization of anterior parts.	11th

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Name.	Age.	Nature of the Case.	When Autopsy made.	State of the Lungs.	Date of the Death.
			Hours.		
T. C.	54	Laceration of scalp, gout, &c.	13	Hepatization of the posterior inferior part of the left lung; bronchitis.	14th day.
S. I.	30	Phlebitis of right arm from punctured wound.	20	Hepatization of lower lobes of both lungs.	11th
E. F.	20	Inflammation of knee-joint; absorption of pus.	36	Both lungs hepatized posteriorly, with slight congestion.	6th
W. H.	60	Fracture of ribs and scapula.	24	Left lung partly hepatized, and in a state of congestive pneumonia, posteriorly; right lung the same. Right pleura contained about 6 oz. of turbid serum—its whole surface was very vascular, and covered to a considerable extent with a film of soft yellowish semi-transparent lymph; left pleura vascular, but less so than the right.	4th
J. D.	70	Incised wound of throat; peritonitis.	24	Congestive pneumonia in first stage posteriorly of both lungs; mucous membrane of bronchi inflamed, with much frothy mucus.	3rd
— B.	60	Lithotomy.	8	Congestive pneumonia in first stage in both lungs in a marked degree; mucous membrane of bronchi much inflamed, with much frothy mucus.	8th
T. P.	48	Compound fracture of leg.	24	Congestive pneumonia in first stage in both lungs posteriorly; in left pleura 3 pints of turbid serum.	38th
W. L.	68	Gangrena Senilis.	21	Pleuræ contained recent lymph; lungs, posteriorly congestive pneumonia in first stage; anteriorly emphysematous; bronchi contained much frothy mucus; lining membrane reddened.	38th
J. H.	64	Disease of wrist-joint.	42	Right pleura contained 2 or 3 oz. of turbid serum; left pleura about 4 oz.; lungs, emphysematous anteriorly; posteriorly congestive pneumonia in first stage.	96th
E. S.	38	Phlegmonous erysipelas of arm.	19	Right pleura contained 6 or 8 oz. of reddish turbid serum, with ramiform congestion and lymph effused; right lung posteriorly hepatized, with congestive pneumonia; left lung healthy.	5th
C. G.	39	Tumour of lower jaw; operation; erysipelas.	—	Right lung hepatized; left lung healthy.	10th

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Name.	Age.	Nature of the Case.	When Autopsy made.	State of the Lungs.	Date of the Death.
			Hours.		
M. W.	38	Tumour of knee; amputation.	26	Congestive pneumonia of left lung posteriorly; right lung compressed by false membranes, and a large collection of serum.	59th day.
J. McG.	67	Compound fracture of left leg.	40	Left lung uniformly congested; emphysematous at some points; right lung congested and softened, but not to the same extent or degree.	5th
M. B.	60	Fracture of neck of the femur.	22	Hepatization of posterior part of both lungs; scattered tubercles in the upper lobes; bronchial membrane inflamed, with much frothy mucus.	4th
C. L.	8	Scrofula.	16	Left pleura, 3 oz. yellow fluid; old and recent adhesions. Right pleura, no fluid; old adhesions, with recent gelatinous lymph. Right lung hepatized with tubercles. Left lung, congestive pneumonia in first stage throughout, with hepatization in parts, and scattered tubercles.	49th
W. R.	37	Psoas abscess, with caries of bodies of lumbar vertebræ.	—	Congestion (?) of inferior posterior parts of both lungs.	25th
W. G.	20	Secondary syphilis; disease of kidnies, &c.	36	Congestion (?) of inferior posterior parts of both lungs.	19th
F. E.	59	Fracture of right patella.	26	Congestion (?) of inferior posterior parts of both lungs.	35th
S. J.	70	Strangulated inguinal hernia; right side; operation.	24	Congestion (?) of inferior posterior parts of both lungs.	2nd
T. J.	37	Punctured fracture of cranium.	17	Congestion (?) of posterior inferior parts of both lungs.	4th
W. W.	34	Fracture of the body of 6th cervical vertebra.	30	Congestion (?) of posterior inferior parts of both lungs.	—
J. T.	50	Abscess of the back.	26	Congestion (?) of posterior inferior parts of both lungs.	16th
J. G.	51	Dislocation of 5th cervical vertebra forwards without fracture.	10	Congestion (?) of posterior inferior parts of both lungs; anteriorly emphysema, with small spots of effused blood.	1st
J. H.	25		—	Congestion (?) of posterior inferior parts of both lungs.	5th

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Name.	Age.	Nature of the Case.	When Autopsy made.	State of the Lungs.	Date of the Death.
			Hours.		
M. W.	49	Wound of brachial artery; apoplexy.	17	Congestion (?) of posterior inferior parts of both lungs.	5th
J. R.	2	Scald of glottis; tracheotomy.	—	Died asphyxiated; very dark congestion of both lungs.	11th
W. M.	54	Contused elbow; delirium cum tremore: secondary abscesses.	—	General bronchitis.	28th
S. E.	16	Scrofulous disease of ankle-joint: amputation.	—	Tubercles and vomicæ in the upper lobes of both lungs.	54th
J. M.	48	Cut throat.	48	Extensive bronchitis.	3rd
W. R.	2	Scald of glottis; tracheotomy.	29	Bronchitis of larger tubes.	2nd
S. R.	24	Œdema Glottidis; tracheotomy.	10	Bronchitis; emphysema.	14th
J. C.	40	Laceration of liver; displaced dorsal vertebræ.	26	Lungs gorged with fluid blood.	6 hours.
W. S.	28	Punctured wound of axilla; severe contusion of left shoulder; phlebitis.	15	Œdema of posterior inferior parts of both lungs.	3rd day.
G. W.	15	Disease of hip-joint.	—	Tubercles in upper lobes of lungs.	70th
S. B.	47	Sloughing ulcer of the neck.	29	Tubercles in right lung.	30th
F. F.	40	Amputation of the thumb; erysipelas.	—	Lungs healthy.	—
C. M.	11	Punctured wound of abdomen; peritonitis.	—	Lungs healthy.	5th
M. D.	40	Fracture of pubes and skull.	30	Lungs healthy.	1st
J. T.	50	Fracture of cranium; injury of brain.	20	Lungs healthy.	1st
J. C.	45	Laceration of spleen and kidney; fracture of the ribs.	70	Lungs healthy.	3rd
——	35	Fracture of skull; injury of brain.	22	Lungs healthy.	1st
D. L.	40	Laceration of liver.	26	Lungs healthy.	3rd

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Name.	Age.	Nature of the Case.	When Autopsy made.	State of the Lungs.	Date of the Death.
			Hours.		
C. W.	45	Fracture of skull; injury of brain.	17	Lungs healthy.	4 hours.
W. T.	62	Compound fracture of femur; amputation.	23	Lungs healthy.	3rd day.
E. W.	75	Fracture of neck of femur; apoplexy.	—	Lungs healthy.	1st
G. D.	—	Strangulated femoral hernia; operation.	16	Lungs healthy.	44 days.
——	—	Effusion of blood between *dura mater* and skull.	—	Lungs healthy.	a few hrs.
J. L.	37	Fracture of pelvis; injury of the bladder and rectum.	16	Lungs healthy.	4½ hours
T. E.	1¾	Fracture of skull; injury of brain.	50	Lungs healthy.	13th

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RESEARCHES

INTO

THE CONNECTION EXISTING BETWEEN AN UNNATURAL DEGREE OF COMPRESSION OF THE BLOOD CONTAINED IN THE RENAL VESSELS,

AND

THE PRESENCE OF CERTAIN ABNORMAL MATTERS IN THE URINE.

By GEORGE ROBINSON, Esq.

Communicated by MARSHALL HALL, M.D., F.R.S., &c.

READ FEBRUARY 14th, 1843.

Having undertaken some experiments with the view of determining the precise cause of the appearance of albumen in the urine, I found that not only liquid albumen and blood, but coagulating lymph or fibrine also escaped into the urinary passages as the consequence of an obstruction to the return of blood through the renal vein. As the unnatural compression of the blood in the renal vessels, thus artificially produced, gave rise to phenomena identical with those constituting the primary effects of inflammation, and as the kidney seemed to present greater facilities for an experimental investigation of that important subject than any other organ of the body, I was induced to

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extend my observations, and to attempt certain modifications of the experiment. The facts thus obtained will, I think, enable us to explain, with more precision than has hitherto been attempted, the true reason of the variable nature of the effusion in different instances: and as this involves physiological and pathological points of some importance, the question may not be deemed unworthy of the consideration of the Society.

As a full description of each experiment must necessarily involve much repetition, and might, therefore, tend to weary and distract the attention, I shall in this place content myself with relating those general results which bear directly on the main object of this communication: leaving the particulars of each experiment to be more minutely described in the appendix to these remarks. With the exception of the first, all these experiments were performed on the kidneys of rabbits. The animals employed varied much in age, size, and condition; and as the strength of the system exerted a very material influence in modifying the nature of the effusion, each experiment must be considered by itself, in order to arrive at a strictly accurate conclusion.

My reasons for selecting the kidney were the following:—

This organ can be readily and quickly exposed in the lower animals, and its artery, vein, and duct, (which constitute almost the sole bonds of union between it and the rest of the body,) may be sepa-

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rately secured by ligature: so that we not only have the circulation through the gland entirely under our command, but are, at the same time, enabled to isolate and confine the secretion, and thus prevent the possibility of error in examining the composition of the latter. Moreover, the recent discoveries of my friend, Mr. Bowman, by clearing away the mystery which had previously surrounded the Malpighian bodies, have made us well acquainted with the minute anatomy of the kidney, and have thereby enabled us more clearly to understand the mechanism of the process.

Having obtained all that I expected from obstructing the return of blood through the renal vein, I was anxious to ascertain the effect of directing, with different degrees of rapidity, an increased flow of blood to the vessels of an organ previously healthy: the passage of this blood being unimpeded by any artificial obstacle, and the organ itself being untouched. After some unsatisfactory trials, I at length obtained results precisely similar to those met with in the former series after venous obstruction.

Although the same general effects were produced in all the experiments, it will be more advantageous to consider them as arranged under two divisions.

The first, containing twenty experiments, in all of which some artificial impediment obstructed the flow of blood through the vein.

The second, comprising fourteen experiments, in

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which an increased determination of blood was directed to one or both kidneys, without any artificial obstacle being opposed to its free return.

After the experiments on the kidneys were performed, it occurred to me, that the observation of the effects of venous obstruction in the vessels of a frog's foot might serve to illustrate the action of the same cause in the former cases.

Accordingly, the hinder extremity of a frog was so included within two ligatures that the artery and bone were the only parts left free. There was some slight oozing of serous fluid from the wound in the ham, and the limb below the ligature speedily became red and swollen. On looking at the vessels in the web with a moderate magnifying power, the veins were seen to be much enlarged, and, as it were, prolonged into the capillaries in consequence of the accumulation of blood in, and distension of, the latter.

At first sight, the blood appeared to have lost all motion; but on examining more attentively, some small arteries were observed in the act of pouring in fresh blood; the impulse of which propelled onwards the column in the veins at each contraction of the heart. During the cessation of that action a retrograde movement occurred: the two alternate actions causing an oscillation of the contained blood.

At the end of half an hour the globules had begun to cohere, and formed by their union irregular masses and cylindrical columns, which

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moved to and fro synchronously with the contraction and relaxation of the ventricle; the former motion being evidently produced by the momentum of the arterial blood, the latter resulting from the resiliency of the elastic tissues.

At the end of seven hours the blood was completely stagnant in all the vessels.

At some points slight extravasation had apparently taken place, for the red outline of the vessels was irregular and ragged. In other places the red line marking their breadth was uniform and even; but a white line of opacity (not unlike that caused in transparent tissues by the effusion of lymph) was situated externally to it.

Various stimulants were then applied to the web without producing any distinct effect either on the vessels or on the blood which they contained. The limb never recovered its vitality, and subsequently underwent the various changes of mortification.

As these effects were such as might have been expected from previous reasoning, and as they were precisely analogous to those which I presumed to occur in the minute vessels of the kidney during the existence of an obstruction to the circulation of the blood through them, I did not think it necessary to repeat the observation.

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CLASS I.—*Illustrating the effects of venous obstruction.*

A.—The ligature around the renal vein being tightly applied, and no hæmorrhage occurring from any of its branches.

No. of Experiment.	Interval between the application of ligature and death of the animal.	Composition of the urine as regards the presence in it of albumen, lymph or blood.
1	10 minutes.	Slightly albuminous.
2	30 minutes.	Ditto. ditto.
3	30 minutes.	No urine in bladder; ureter not examined.
4	10 minutes.	Highly albuminous.
5	6 minutes.	Very highly albuminous, and some slight appearance of fibrine.
6	3½ minutes.	Bloody.
7	1 hour.	Ditto.

These experiments alone suffice to show that the same kind of effusion does not necessarily and constantly result from the existence of the same degree of obstruction. It will be evident that this latter constitutes but one of the conditions required to cause the exudation of the more viscid portion of the blood through the coats of its containing vessels. A certain amount of impulse of the arterial blood must always co-exist and co-operate with the obstruction, before that species of effusion can take place. The activity of this force will of course be proportioned to the rapidity and vigour of the ventricular contractions; and it is to the varied power of the heart's action, at the moment of applying the ligature, that I ascribe the different results met with in the above experiments. I have throughout invariably observed that the effects of an intense degree of compression were chiefly to be expected in

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those instances where the animal seemed to recover most speedily from the shock of the operation.

B.—The obstruction of the renal vein being either incomplete or gradually effected.

In 6 cases some venous hæmorrhage occurred from accidental or intentional laceration of the vein or its branches.

In 2, the coats of the vessel were raised by a forceps, and a ligature so applied as to include only half the vein; leaving it at the moment pervious, though of diminished calibre.

In 4, a thread was passed around the vein, and so tied as to enclose the latter within a loose loop; the vessel itself not being compressed by the ligature.

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The results will be most readily understood by a glance at the subjoined Table:

No. of each experiment as related in the Appendix.	Interval between the application of obstruction and death of the animal.	Composition of urine.
1	1 hour.	Slightly albuminous.
2	30 minutes.	Highly albuminous.
3	7 minutes.	Slightly albuminous.
4	1 hour.	A mass of lymph in the bladder.
5	1 hour.	Blood and fibrine.
6	1 hour.	Lymph and blood.
7	40 minutes.	Bloody.
8	4½ days.	Urine muddy and faintly albuminous.
9	18 hours.	Bloody.
10	1 hour.	Bloody.
11	24 hours. (?)	Moderately albuminous.
12	2½ days.	Reddened by blood, and highly albuminous.

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The lymph found in the bladder, in one of these experiments (No. 4), was beautifully clear and pellucid. It was semi-fluid when first examined, but coagulated more firmly on exposure to the air.

I am not aware that any other instance is recorded of the effusion of coagulating lymph, as the consequence of simple compression of the blood from venous obstruction. The quantity was so considerable, in this case, and the manifestation of its peculiar properties so decided, that there was not the least room for doubt. The physical condition of the blood in the vessels of this kidney must have been that of a fluid subjected to a continued moderate pressure: for, in consequence of a slight laceration of the vein, the blood could not be compressed beyond a certain degree, as it would then tend to ooze through the lateral opening. I have not succeeded in obtaining so much lymph in any subsequent experiment. It must ever be a very difficult point so to adjust the obstruction to the amount of impulse of the arterial blood as to maintain the requisite degree of compression, and no more, for a sufficient length of time. The two succeeding experiments confirm the accuracy of the explanation just given: for in them the vein, being first tied tightly, was then punctured on the renal side of the ligature, so that a small jet of blood escaped. The organ being returned while in this condition, and the urine examined, at the end of an hour, both fibrinous and bloody coagula were found suspended in it. I think it not improbable that the blood, in these instances, escaped during the short interval

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that elapsed between the application of the ligature, and the puncture of the vein. For it will be remembered that, in a former case, blood was found in the urine at the end of three minutes and a half after the obstruction took place.

Three of the above experiments (viz., the 8th, 11th, and 12th,) are related, not only for the illustration they afford, of the general principle here advocated, but from their tending to throw light upon the changes which these engorged organs would subsequently undergo. The circumstance of blood and albumen being present in the urine at so late a period as the third or fourth day after the operation, may be partially explained by the slow progress of bloody or fibrinous coagula along the ureter. At the same time, I think it is possible that some albumen may have been derived from the other kidney, in consequence of the increased determination to that organ. I cannot help thinking that the morbid appearances which these three engorged kidneys presented, viz., the formation of an exterior membrane or cyst, the appearance of white spots on the external surface of the organ, as in Experiment 12, and the more extensive disintegration met with in Experiment 8, were but the first of a series of changes which would finally have terminated in the softening down of the whole organ, and its conversion into a puriform mass. And it seems by no means improbable that when abscess of the kidney follows acute nephritis in the human subject, the formation of a bag of pus (as met with in *post mortem* examinations) takes

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place in a similar manner, and is preceded by similar changes. An extended investigation of the changes which kidneys thus treated would finally undergo could not fail to throw important light on some of the secondary effects of inflammation.

I shall now pass on to the second class of experiments, or those intended to illustrate the effects of an increased determination of blood to the vessels of a part previously healthy.

It occurred to me, that if an increased flow of blood could be suddenly directed through any particular artery, the contractility of the smaller vessels would resist the rapid dilatation necessary for the free passage of the augmented quantity of fluid, and thus give rise to some obstruction. If any obstruction did take place, then both the conditions required to produce undue compression of the blood would co-exist, and some of its effects should be perceptible in the urine.

Class II.

A.—I first attempted to accomplish this end in the case of the renal artery by removing one kidney, thinking that the physiological determination to the other might suffice. I repeated the experiment five times, chiefly in young and weak animals. The only constant result observed was a progressive increase in the weight of the remaining kidney. In one instance there were some slight traces of albumen in the urine.

B.—I then, in two small weak animals, tied the

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abdominal aorta below the origin of the renal arteries. In one instance the urine was slightly albuminous.

C.—As I did not by these measures, used singly, obtain very satisfactory results, I then wished to ascertain whether the simultaneous performance of both operations *in animals of greater strength*, would not, by the conjoint influence of the physical and physiological determination of blood to the remaining kidney, induce the presence of albuminous matters in its secretion. I performed seven experiments. The three first did not succeed; but a glance at the particulars of each, as given in the appendix, will, I think, suggest a satisfactory explanation of their failure. And any uncertainty which these negative results may have created as to the truth of the principle sought to be established in this part of the memoir, must be in a great measure removed by a careful perusal of the four last experiments. Thus in

	The animal living	
Exp. 4.	18 hours.	The urine contained blood, and the liquid portion albumen.
5.	about 2 days.	It was highly albuminous.
6.	3½ hours.	A coagulum of blood, another of fibrine, and was highly albuminous.
7.	2 hours.	Blood and albumen.

In removing the left kidney, care was taken to

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secure the ureter as well as the blood-vessels. That these albuminous matters were derived from the right kidney, is proved beyond a doubt by the existence of ecchymoses in its substance and on its surface in two instances, (Exp. 4th and 7th,) by the increase of its weight, as seen in Exp. 6 and 7, and by the fact of the morbid products being detected in the right ureter in Exp. 6.

By selecting strong full-blooded animals, the repetition of this experiment would doubtless yield results precisely similar to those just detailed. I think the experiments related in the first division of this class, though yielding but negative evidence in support of the main point of this inquiry, are not altogether undeserving of consideration, and may be advantageously contrasted with the four last of the third division. For we learn from the former that a gradually increased quantity of blood may be directed to the vessels of a part without occasioning any material obstruction and compression of that fluid. While the concluding experiments show clearly that if the quantity determined to any particular set of vessels be considerably and *suddenly* increased, then some of the ordinary effects of undue compression of the blood will be produced.

Having now mentioned concisely the general results obtained, I may be allowed to allude again for a moment to those two conditions by which the compression of the blood in its vessels is produced and regulated.

This compression is altogether dependent upon

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the co-existence and co-operation of two essential causes, each of which will, in different individuals, vary much in its amount of activity or degree of completeness.

The momentum of the arterial blood arising from the contractions of the ventricle constitutes the active force from the operation of which the compression takes place. But as a counter resistance is required before an intense degree of the latter state can occur, it is only when some extraordinary obstruction to the free passage of the blood *through the smaller vessels* exists that the effects of an undue compression of that fluid are perceptible.

It follows, therefore, that the momentum being equal in a number of cases, the intensity of the compression of the blood will be proportioned to the completeness of the obstruction: and, on the other hand, the impediment or obstruction being equally complete, the degree of compression will then be commensurate with the amount of the momentum.

The whole of the preceding experiments, if carefully considered, will, I think, support this statement.

They also prove—

1. That simple compression of the blood in its smaller vessels will, in a direct ratio to the degree of intensity of that compression, cause the exudation of an albuminous fluid, of coagulating lymph, or the extravasation of blood. Its immediate effects, therefore, precisely resemble those of inflammation: and

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as it is well ascertained that both the essential causes of undue compression (viz., an obstruction or impediment to the flow of blood through the vessels of the inflamed part, and excessive action of the heart,) co-exist in that disease, it seems but reasonable to infer that the primary effects of inflammation, being identical with those of undue compression of the blood, are the mere consequences of that physical cause.

2. That there is no relation between the composition of the effused matters and the extent of the dilatation of the coats of the vessels, as measured by the quantity of blood they contain. To establish this point more clearly, I subjoin a short Table, exhibiting the relative weights of the healthy and engorged organs, and the nature of the effusion.

Order of the Experiments in the Appendix.	Weight of healthy kidney.	Weight of engorged kidney.	Relative Weights.	Condition of the Urine.
Class 1.	grs.	grs.		
A. Exp. 1st.	20	40	1–2.	Faintly albuminous.
— 4th.	35	70	1–2.	Highly albuminous.
— 5th.	25	50	1–2.	Highly albuminous.
— 6th.	60	90	1–1.50	Bloody.
— 7th.	98	175	1–1.78	Bloody.
B. — 1st.	40	84	1–2.10	Slightly albuminous.
— 2nd.	50	150	1–3.	Highly albuminous.
— 4th.	100	130	1–1.30	A mass of lymph.
— 5th.	50	90	1–1.80	Bloody; with a fibrinous coagulum.
— 7th.	35	68	1–1.94	Bloody.
— 9th.	64	182	1–2.84	Bloody.
— 10th.	90	170	1–1.88	Bloody.

In conclusion, I may again repeat my opinion, that the process of the effusion of albumen and

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lymph through the coats of the vessels of the living body is dependent on, and regulated by the degree of the compression of the blood contained within those vessels.

My chief object in undertaking this investigation was to endeavour to extend the application of ordinary physical laws to the explanation of some of the morbid and healthy phenomena of the animal body: for it seemed to me that if a few simple general principles could be established, we might then hope to understand more clearly the true nature of disease, and perhaps ultimately be enabled to treat it with greater success.

EXPERIMENTS ON THE KIDNEY.*

Class I.—*Illustrating the Effects of Venous Obstruction.*

A.—The closure of the renal vein by ligature being immediate and complete.

Exp. 1. The left renal vein of a young weak rabbit was tied, and the animal killed at the end of ten minutes. The bladder was distended with urine, which, when tested by nitric acid and heat, presented permanent flakes. The right kidney weighed 20 grs.; the left 40 grs.

* Six of the experiments on venous obstruction were published in the Medical Gazette of June 1842; but as they serve to render the series more complete, and as the weight of the healthy and engorged kidneys was carefully ascertained, I have been induced to recapitulate them.

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Exp. 2. The same operation was performed on a rabbit of similar size and condition, which was killed at the end of half an hour. A smaller quantity of urine was found in the bladder, which when tested by the same re-agents presented a more distinct flakiness. Weight of the right kidney, 26 grs.; of the left, 51 grs.

Exp. 3. A small weak animal was killed at the end of half an hour after ligature of the left renal vein. There was no urine in the bladder; the ureter was not examined. The right kidney weighed 26 grs.; the left, 50 grs.

Exp. 4. An animal of middle size, and in moderate condition, was killed ten minutes after ligature of the vein. There was about a drachm of urine in the bladder, which was highly albuminous. The right kidney weighed 35 grs.; the left, 70 grs.

Exp. 5. The left vein and ureter being tied, in a young healthy rabbit, the animal was killed at the end of six minutes. The ureter being first carefully wiped, and then divided, the urine contained in it was allowed to drop on a watch-glass, and on being tested with nitric acid, it formed a solid clot. There was a slight appearance of coagulated lymph in the pelvis of the kidney, and a more copious effusion was found beneath its lining membrane. The bladder contained a drachm of urine, which was not albuminous. The right kidney weighed 25 grs.; the left 50 grs.

Exp. 6. The left renal vein of a middle-sized healthy animal was tied, then the ureter, and ex-

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actly three minutes and a half after the ligature of the vein, the artery was secured, and the organ removed. The ureter contained bloody urine. The right kidney was then removed: it weighed 60 grs.; the left, 90 grs. The animal died towards the end of the second day, having previously manifested marked comatose symptoms. No morbid appearances worthy of mention were found.

Exp. 7. In a full grown, strong rabbit, the abdominal aorta was exposed by an incision on the left side of the spine, and seized by a powerful spring forceps. The hinder extremities were immediately paralyzed. The blades of the forceps, the extremities of which were notched, were then separated and withdrawn; but, in taking this step, the coats of the artery became twisted and torn, and considerable hæmorrhage ensued. This was, however, arrested in a few minutes by compression of the trunk above. The left kidney was then drawn out through the same opening, its vein and ureter tied, and the organ returned. The animal seemed at first faint from the loss of blood, but gradually recovered; it was killed at the end of an hour; the paraplegia continuing unchanged till death. The left kidney was much engorged, and presented on its surface several spots of ecchymosis: it weighed 175 grs.; the right kidney, 98 grs. The left ureter contained a coagulum of blood, and above it some muddy brownish fluid, which, on exposure to the air, assumed a bright red tint. The bladder contained nearly two drachms of urine, which was natural in its appearance; and on

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being examined, contained no albumen, a few drops of nitric acid rendering it quite clear. The aorta had been torn rather more than two-thirds across; its compression, by the infiltration of the surrounding cellular tissue with a considerable quantity of blood, probably prevented the return of hæmorrhage by obliterating the vessel at that point.

B.—The canal of the renal vein being either partially or slowly obstructed.

Exp. 1. The animal was of middle size, but in poor condition. In tying the vein there was some hæmorrhage from a lateral branch. The animal had previously met with a slight accident, and seemed faint at the time; it was killed at the end of an hour, and the urine in the bladder was slightly but distinctly albuminous. The right kidney weighed 40 grs.; the left, 84 grs.

Exp. 2. In passing a ligature round the vein of a rabbit of middle size, and in moderate condition, the coats of the vessel were torn, and some hæmorrhage occurred, which was soon arrested by compression; it was killed at the end of half an hour. The bladder contained two drachms of urine, which was highly albuminous. The right kidney weighed 50 grs.; the left, 150 grs.

Exp. 3. The left renal vein of a middle-sized weak rabbit was exposed, compressed for a few minutes, and then slightly torn, so as to allow a little blood to escape. The vessel was then securely tied, and the animal killed seven minutes after the

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application of the ligature. The urine in the bladder was very slightly albuminous. On dividing the left kidney, the lining membrane of the pelvis was rendered prominent by the deposition beneath, or external to it, of a quantity of clear lymph, in which the larger branches of the vein were imbedded. There was no appearance of lymph in the cavity of the pelvis. The right kidney weighed 42 grs.; the left, 73 grs.

Exp. 4. In tying the vein of a strong full-grown rabbit, the coats of the vessel were slightly lacerated, so that a little blood continued to ooze out by the side of the ligature. In this state the organ was returned, and the animal killed at the end of an hour. Some urine had escaped through the urethra; but on laying open the bladder, it was found to contain a scruple, by weight, of clear pellucid lymph, which was semi-fluid when first examined, but coagulated more firmly on exposure to the air. The right kidney weighed 100 grs.; the left, 130 grs.

Exp. 5. A middle-sized animal, in tolerable condition. The left renal vein was tied, and then punctured with a fine needle on the renal side of the ligature, so that some blood escaped in a fine jet. The organ was then returned within the walls of the abdomen, and the animal killed at the end of an hour. The bladder contained about two drachms of bloody urine, which held suspended in it a coagulum of fibrine. This latter was reddened only at one point; the rest of it being unstained by blood. The pelvis of the kidney also contained a small quantity

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of lymph: this organ weighed 90 grs.; the weight of the right one being 50 grs.

Exp. 6. The left renal vein of a small healthy animal was tied, and then lacerated on the renal side of the ligature. While bleeding freely, the organ was returned, and the animal killed at the end of an hour. The urine in the bladder was not albuminous; but the upper part of the ureter contained a column of lymph, which, at its lower end, was slightly tinged with blood. The left kidney was considerably enlarged, but the precise weight was not taken.

Exp. 7. In a young healthy rabbit the coats of the left vein were pinched up by a forceps, and so tied that the calibre of the venous canal would be considerably diminished. The animal was killed at the end of forty minutes. The bladder contained about a drachm of urine, which was not albuminous; but on further examination, the reason of this was apparent; for the left ureter was found completely obstructed by a coagulum of blood, behind which a quantity of bloody urine had accumulated. Some lymph had also been effused beneath the lining membrane of the pelvis. The right kidney weighed 35 grs.; the left, 68 grs.

Exp. 8. The left kidney being exposed in a healthy young rabbit, the coats of the vein were pinched up by a forceps, and so tied as materially to diminish the calibre of, without completely obstructing, the venous canal. The organ was then returned, and the animal killed at the end of four and a half days.

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The bladder contained a little muddy urine, which was faintly albuminous. The tubular portion of the right kidney was somewhat redder than usual. The left kidney was found enclosed within a perfect cyst of considerable thickness. I could not detect any connection or adhesion between the kidney and its cyst; for the former could be drawn out, and removed without any resistance being experienced: but between it and the interior of the cyst was a thin stratum of purulent looking fluid. This kidney was evidently smaller than the right one; its surface was soft and flocculent, and this looseness of structure extended towards the centre of the organ, becoming, however, gradually less marked. On making a section of it, the tubular portion, in its interior, presented a natural firmness and structure; but it appeared redder than usual, as if it had been lately engorged.

Exp. 9. In a middle-sized strong animal, the right renal vein was exposed, and a ligature tied at such a distance from the vessel as not immediately to impede the flow of blood through the latter. The ureter was also tied. At the end of eighteen hours, the animal was killed. The urine found in the bladder was not albuminous; that in the right ureter seemed nearly pure blood. The left kidney weighed 64 grs.; the right, 182 grs.

Exp. 10. The left renal vein of a full-grown fat rabbit was, in the same manner, included within a loose loop, and the animal killed at the end of an

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hour. The bladder contained bloody urine. The right kidney weighed 90 grs.; the left, 170 grs.

Exp. 11. The left renal vein being exposed, in a small healthy rabbit, the artery was seen to pass obliquely behind it, rendering it very difficult to isolate the former vessel. A thread was passed around both, and tied so as to enclose both within a loose loop. Eight hours afterwards, the animal was alive and well. At the end of twenty-four hours, I found it dead and cold. The left kidney was much enlarged; it was enveloped in a distinct cyst, apparently formed of the surrounding cellular tissue, which had been infiltrated with blood and lymph. Except at one point, where the kidney had been slightly scratched, there was no adhesion between that organ and its investing membrane; in fact, they were separated from each other by a small quantity of serous fluid. After reflecting this tunic, an inner one (which I imagined to be the proper capsule) appeared, and, like the former, could be detached from the surface of the gland: thereby proving satisfactorily the real existence of a second membrane. The bladder contained about a drachm of clear urine, which was moderately but distinctly albuminous.

Exp. 12. A precisely similar operation was performed on a rabbit of the same size, the vein alone being included in the loop; it died at the end of two days and a half. The left kidney was surrounded by a cyst similar to that met with in the

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last experiment; it adhered slightly at one or two points to the capsule; the latter could be stripped off the kidney, and the separate existence of the two membranes thus manifested. The external surface of the gland presented three or four white spots, resembling those of incipient suppuration or softening. The urine in the bladder was of a faint reddish tinge, and was very highly albuminous.

Class II.—*Designed to illustrate the Peculiarities of Arterial Determination.*

A.—Removal of one kidney.

Four animals, of the same age and size, and in similar condition, were selected. The operation was performed at the same time on all of them, and the left kidney weighed at the time of its removal.

Exp. 1. The left kidney of a healthy young rabbit was removed, the vessels being previously tied; it died at the end of twenty-four hours, partly from the shock of the operation, and partly from peritonitis. The urine in the bladder was not albuminous. The left kidney, when removed, weighed 20 grs.; the right, 25 grs.

Exp. 2. A similar operation was performed. The animal appeared quite well at the end of the second day, when I poured some cold water over it, with the view of increasing the determination to the remaining kidney; it seemed unable to bear the shock, and died about the end of the third day. The urine contained no albumen; but on adding an ad-

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ditional quantity of nitric acid, there was a copious precipitation of crystals of nitrate of urea. The left kidney weighed 21 grs.; the right, 26 grs.

Exp. 3. At the same period, after the operation, this animal was treated in the same manner as the last; it lived twelve hours longer than it. There was no albumen in the urine; nor did any deposit of urea take place on adding an equal quantity of nitric acid. The left kidney weighed 20 grs.; the right, 33 grs.

Exp. 4. Nine days and a half after the removal of its left kidney, this animal appeared quite well; it was then killed. The bladder contained a small quantity of urine, which yielded a faint cloudiness when treated with nitric acid. The left kidney weighed 21 grs.; the right, 50 grs.

Exp. 5. The left kidney of a middle-sized strong rabbit was removed, and the animal killed at the end of nine days. The left kidney was unfortunately not weighed; the right was evidently much enlarged. The urine in the bladder was not albuminous.

B.—Ligature of the aorta, below the origin of the renal arteries.

Exp. 1. In a small weak rabbit, the abdominal aorta was tied, from an incision on the right side of the spine, which added to the difficulty, and, consequently, increased the shock of the operation. There was immediate and permanent paralysis of the hinder extremities. The animal died about ten

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hours after the operation. Both kidneys appeared disproportionately large; each weighed 36 grs., and the tubular portion of each was reddened. The urine was tested with nitric acid. In a small quantity, there was no appearance of albumen; in a larger, some permanent opacity was produced, not removable by a slight excess of the acid.

Exp. 2. The aorta was tied, from an incision on the left side of the spine, in a middle-sized animal, in poor condition. There was immediate paraplegia, as in the last instance. Some hæmorrhage from the smaller vessels occurred. It was killed at the end of forty minutes. Both kidneys were of a lighter, or more rosy tint than natural; the tubular portion of each was reddened. The left weighed 4 grs. more than the right; probably from the lower origin of the left renal artery in this instance. The urine in the bladder was not albuminous.

C.—Ligature of the aorta, and removal of one kidney.

Exp. 1. The aorta of a middle-sized animal, in poor condition, being exposed by an incision in the left lumbar region, it was grasped by a spring forceps of moderate power. The obstruction to the flow of blood was complete, for the artery visibly enlarged above the point of compression. The animal was then liberated, and its hinder extremities were seen to be paralyzed, the useless limbs trailing after the rest of the body. The blades of the forceps were then separated, and carefully withdrawn, and

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the animal almost instantly regained the power of moving its limbs. A thread was then passed beneath the aorta, and a knot tied at such a distance from the vessel as not to obstruct the flow of blood. The left kidney was now removed; it weighed 33 grs. On laying it open, the tubular portion was reddened, and on dissecting off the lining membrane of the pelvis, the primary arterial divisions beneath it were seen to be embedded in a quantity of clear lymph. The paralysis of the hinder extremities *never* returned. Four hours after the operation, it was alive, and hopping about. At the end of eighteen hours I found it dead. The right kidney weighed 35 grs. No lymph could be seen beneath the lining membrane of the pelvis. The bladder was distended with urine, which was not albuminous. The ligature hung quite loosely on the aorta, but some bloody lymph had been effused around it.

Exp. 2. In an animal of similar size to the last, and, like it, in very poor condition, the aorta, being exposed, was compressed by the same forceps, and the animal then set free. There was perfect paraplegia. The forceps being separated and withdrawn, it continued to lie in the same position, having its hinder extremities extended and useless, for a few seconds, and then suddenly sprung up with a bound, having perfectly regained the power of moving them. The aorta was then tied tightly, when the paralysis immediately returned, and continued unchanged till death. The left kidney being now removed, weighed 32 grs.; on laying it open, the redness of the tubu-

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lar portion, and the effusion of lymph beneath the membrane of the pelvis, existed as in the previous case. The animal was alive four hours afterwards, and was found dead about eighteen hours after the operation. The right kidney weighed 32 grs., and presented precisely the same appearances as the left. The bladder was full of urine, which contained no albumen.

Exp. 3. The left kidney of a very weak small animal was removed, and the aorta exposed. Some difficulty was experienced in passing a thread around the latter, in consequence of a great quantity of citron-coloured serous fluid accumulating in the wound; it did not flow from the peritoneal cavity, but was a mere oozing from, or through the vessels. The blood was very poor; its want of viscidity, as felt by the fingers, was very remarkable. The aorta was tied tightly, producing instantly the ordinary paralysis. The animal was killed at the end of five minutes; but, from the absence of any unnatural appearance in the right kidney, I did not deem it necessary to examine the urine.

Exp. 4. The aorta of a healthy young rabbit being tied, produced, instantly, permanent paraplegia. The left kidney was then removed, and weighed 30 grs. At the end of eighteen hours, the animal was still alive, but apparently at the point of death; it was then killed. The right kidney being examined, was reddened in every part of its substance, and presented on its surface some slight spots of ecchymosis, but it only weighed 30 grs. The bladder

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contained about a drachm and a half of muddy red urine, which held bloody coagula suspended in it. On testing the liquid portion with nitric acid, albuminous flakes were produced.

Exp. 5. The aorta being exposed, in a young healthy rabbit, was included within a loose loop. The animal continued to run about without any appearance of paralysis. The left kidney was removed at the same time, and weighed 35 grs. Twenty-seven hours afterwards, the power of motion was still unimpaired. At the end of the second day it was found dead. The right kidney weighed 42 grs. On tracing the aorta, it was seen to be embedded in a quantity of lymph, that had been thrown out round the thread, but the canal of the vessel was still pervious. The loop had been applied about half an inch below the origin of the right renal artery, which seemed rather enlarged. The bladder contained nearly two drachms of urine, which was highly albuminous, forming instantly a large coagulum on the addition of nitric acid.

Exp. 6. The aorta of a full-grown strong rabbit was tied tightly, and the left kidney removed; but the ligature round the vessels of the latter having become somewhat loosened, some active arterial hæmorrhage took place. This kidney was of a lighter tint than usual, and weighed 82 grs. The ordinary paraplegia was present. Three hours and a half after the operation, the animal was in the same condition, and was then killed. The right kidney was enlarged and reddened; it weighed 112

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grs. The bladder was nearly empty, only two or three drops of bloody urine escaping from it. On tracing down the ureter, its upper portion was dilated to the extent of more than an inch. A coagulum of blood plugged up the lower end of this portion, and on removing it by the division of the tube, a few drops of bloody urine escaped, then some clearer fluid, then a white fibrinous coagulum, and, above all, some twenty drops of clear urine. On allowing the latter to fall into a watch-glass, without any admixture of the bloody urine, and then adding nitric acid, it was found to be very highly albuminous, instantaneous coagulation being produced by this test.

Exp. 7. The left kidney of a middle-sized rabbit, in rather good condition, was removed, and found to weigh 54 grs. The aorta was then tied, without any accident occurring, and was followed by the usual paralysis. This animal seemed to recover from the shock of the operation more quickly than some former ones; it was killed at the end of two hours. The right kidney weighed 85 grs.; it contained six or seven ecchymoses of various extent, in different parts of its substance, but chiefly on the surface; its colour was much lighter than in those experiments in which the engorgement of the organ was produced by venous obstruction. The bladder contained about a drachm of urine, which was bloody and albuminous.

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AN ACCOUNT

OF

AN UNUSUALLY LARGE BILIARY CALCULUS,

VOIDED FROM THE RECTUM.

By JAMES ARTHUR WILSON, M.D.,

PHYSICIAN TO ST. GEORGE'S HOSPITAL.

READ FEBRUARY 14TH, 1843.

Cases truly clinical are often best distinguished by their missing symptoms. The Biliary Calculus, large as a full-sized walnut, which I now lay before the Society, on its passage to the bowel, induced jaundice, yet gave *no pain.*

It was voided with fluid fæces from the rectum of a gentleman aged 73, after many days of exhaustion by hiccough and vomiting. The early symptoms in this case were constipation, loss of appetite, and sickness, succeeded by jaundice in the latter days of November of the present year, 1842. In less than a fortnight from the commencement of the attack, the urine and fæces had recovered their natural appearance; the skin was no longer yellow, and the patient began to occupy himself with his

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usual pursuits. On the night of December 9th, he was attacked, while in bed, by sudden and profuse bilious vomiting, with a "feeling of soreness" in the lower belly. His moral energies were much depressed, and the bowels again became slow. Shortly after this gush of bile from the stomach, a large quantity of highly fœtid, dark-coloured fluid was ejected, likewise by vomiting. This offensive discharge soon became black as "coffee-grounds," and continued at intervals for about thirty hours. Alternating with the fits of sickness, there was intense clammy thirst, with frequent and protracted hiccough. Until this period of the complaint, when, by the removal of obstruction from its excretory ducts, the bile had again found free access to the bowels, there had been no local suffering in any part of the abdomen. The pain, of which the patient now first complained, was at no time severe, and seemed to track the long pent-up bile and putrid fluid in their progress along the intestinal tube. After a short interval of remission, on December 14, all the urgent symptoms returned, with frequent grievous aggravation of the hiccough. Food in the smallest quantity was refused instantly by the stomach, and for two days the case appeared to be fast verging to a fatal termination. On December 17, the bowels, long previously inactive, under large and repeated doses of calomel and other purgatives, began spontaneously to relieve themselves, and soon gave passage to the smooth globular substance, which is now submitted for inspection to the Society. The

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shining central radiated portion of this concrete mass is evidently cholesterine. Its brown laminated outer crust, interspersed with particles of crystalline matter, is supposed by Dr. Prout to consist principally of inspissated bile. It was examined by this distinguished physician and chemist, on the request of Dr. Latham, with whom I consulted on the case, at the most critical period of its character. Upon the event of this excretion, all the urgent symptoms gradually and entirely subsided. During their continuance there was no evidence of fever; the tongue was but slightly coated, and the pulse maintained it usual average of from 60 to 65 beats in the minute. The subject of this case, an old gentleman of cheerful temperate habits, resided in the West Indies during the greater part of his early life. For the last five and twenty years he has been much harrassed by a loud, inveterate stomach cough, accompanied by profuse expectoration, and frequent vomiting of a thick tenacious mucus. About ten years ago he voided more than twenty feet of tape worm, after a dose of turpentine, which he took on my prescription.

I have been reminded by this case of another instance of biliary concretion, analogous by its size and extent of pressure, as by the negative character of its symptoms.

On the examination, *post mortem*, of a female patient, aged 47, who died comatose, with jaundice, while under my care in St. George's Hospital, in October 1833, a round calculus, described in a note

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of the same date as "enormous and large as a walnut," was found impacted in the ductus communis hepaticus. A smaller concretion of irregular shape was lodged in the duct, where it passes obliquely through the coats of the duodenum. The gall-bladder was small, nearly empty, and contracted to an hour-glass shape by partial adhesion of its inner central surface. It contained a small calculus in the cavity thus formed at its convoluted extremity. The ductus cysticus, the ductus hepaticus, and the bile-ducts generally throughout the liver, were exceedingly dilated by accumulation of their proper fluid behind the obstruction on its current to the bowel. The patient in this case had complained much of weight in the upper abdomen, but never of pain. There is an inference from these cases that may be remembered with advantage in our diagnosis of jaundice and constipation. The progress of gall stones, (even when inordinate in their dimension,) through the ducts, is not disproved by the absence of pain from the epigastrium.

Dr. Bence Jones has since favoured me with the following analysis of the substance in question:

"This calculus was lighter than water, and consisted of two parts, a central white crystalline radiating matter, which cut like wax, and an exter-

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nal dark brown substance, which was deposited in irregular layers, which were not crystalline, and which broke in dividing.

"The centre, when heated, melted, took fire, burnt with a clear flame, leaving no ash. It was entirely soluble in hot alcohol, and was deposited on cooling in scales.

"The external part was very slightly soluble in water. When heated it did not melt, but after a time took fire, and burnt with a smoky flame, leaving a white ash. ·277 grains of calculus gave ·024 grains of ash, that is about 8·6 per cent. This ash consisted chiefly of carbonate of soda, with a little phosphate of lime.

"The external substance dissolved with effervescence in nitric acid, giving off nitric oxide gas. The solution was at first deep red, and became, when heated for some time, yellow. It was dissolved by caustic potash, and the solution in the cold was yellow, and when heated became dark green. Treated with hot alcohol, a very small portion of this external substance was dissolved and crystallized on cooling, in scales.

"Hence the centre of this calculus consists of nearly pure cholesterine, and the external part of inspissated and altered bile, with a little cholesterine or fatty matter. The colouring matter of the external part is identical with the cholepyrrhin of Berzelius, which is the same as the colouring matter of the leaves of plants.

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"When burnt, dissolved in pure hydrochloric acid, evaporated to dryness, redissolved in water, and tested with ferroprussiate of potash, no Prussian blue was formed: hence none of the colouring matter of the blood is present in this calculus."

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ON

FATTY DEGENERATION OF THE ARTERIES,

WITH A NOTE ON SOME OTHER FATTY DEGENERATIONS.

By GEORGE GULLIVER, Esq., F.R.S.

Communicated by THOMAS HODGKIN, M.D.

READ FEBRUARY 28TH, 1843.

It has long been known that the arteries are very liable to a disease in which a soft matter of diverse consistency, and usually of a brown, yellowish, or white colour, forms between the internal and middle coats; that this matter, though it has been variously denominated, has often received the epithets atheromatous and steatomatous; that it is sometimes a forerunner of partial thinning and destruction of the internal membrane, a frequent concomitant of thickening and corrugation of this tunic, and of ossification of the vessels. And it is as well known that their inner surface is extremely subject to small opaque white or buff-coloured spots, either isolated, grouped together in irregular patches, arranged in streaks, or so diffused as to present

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merely a clouded or speckled appearance. These spots are seated in the internal membrane, occasionally confined to the epithelium, often occupying the whole thickness of the coat, and extending thence to the middle one, in which stage of the disease the matter first mentioned will generally be found in more or less quantity between the two coats.

But although the frequency of these diseased conditions has made them familiar to the pathologist, and their connection with the cause of aneurism, and with the obstruction and obliteration of arteries, must have occurred to almost every one who has investigated the diseases of the blood vessels, I am not aware that the morbid products in question have yet been made the subject of precise inquiry.

In the matter between the inner and middle coats, the following constituents may be seen with the aid of the microscope, namely:—transparent crystalline plates of a pearly lustre; oily globules of variable magnitude, the largest of which are free, while the smaller spherules are often aggregated together in the form of round, oval, or shapeless corpuscles; small earthy concretions; and a multitude of very minute particles, frequently forming a kind of granular ground for the other objects. When the matter is thick, they will be all best seen after diluting it with water or weak acetic acid. Sometimes the small oily globules form a larger corpuscle by mere aggregation; occasionally they adhere to an albuminous flake; while in the large rounded or oval corpuscles, the little oily particles are usually

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connected together by a very fine granular precipitate. The appearances just described are represented in the figures 1 and 2.

The fatty matter is often sufficiently abundant to give a greasy stain to paper when dried on it by heat.

The crystals are of cholesterine, as I learn from Dr. Davy, who kindly undertook the examination of different specimens of them which I sent to him for the purpose. Besides the cholesterine, he found that the hot alcoholic solution deposited on cooling a few needle-crystals, which had the properties of cholesteric acid. He also detected in the matter a notable quantity of oleine, with a smaller proportion of margarine, a little albumen, and earth of bones.

I have examined a great number of arteries affected with the disease, and never failed to detect oily globules and an abundance of cholesterine in the matter. Pursuing the instructions of Dr. Davy, I have also repeatedly dried it, as well as the middle coat of the vessel, extracted the fatty materials by boiling alcohol, observed the crystals of cholesterine and some margarine deposited as the solution cooled, and obtained the oleine by evaporating the spirit.

There is almost always atrophy and discoloration of those parts of the middle coat of the artery which happen to be near to the accumulated fatty matter; and more or less thinning and weakness of this coat appear to be often, if not generally, asso-

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ciated with thickening and corrugation of the internal membrane. On these points Dr. Davy has made similar observations.*

In the spots of the inner membrane, the bright fatty globules are very characteristic, and often plentiful enough to give a greasy stain to paper when dried on it by heat. Their most common arrangement is shown in figures 3 and 4. Crystals of cholesterine are frequently seen in the spots, though not so commonly as in the more abundant deposit between the internal and middle coats; and the speckled inner tunic generally yields a little cholesterine to hot alcohol.

There is seldom ossification of the arteries, or thickening and puckering of their lining membrane, without the formation of fatty matter between this coat and the middle one, as well as in the substance of both of them. The matter may be so scanty as only to be found after a careful search; but even in this case, in any places where the middle coat has become thinned or discoloured, or the connection between it and the lining membrane loosened, and a little of the soft opaque matter can be scraped off for examination, the cholesterine and oily particles may be detected with the aid of the microscope; and so it is also with even the smallest quantity of the opaque liquid or pulpy matter which may be found in contact with the bony plates.

* Researches, Physiological and Anatomical, Lond. 1839, vol. i. p. 372 & 436.

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In fact, ossified blood vessels, especially when there is any pulpy matter in their tunics, are generally in a state of fatty degeneration. In some portions of aorta which Dr. Davy did me the favour to examine, he found the fatty substances in the bony scales of the inner coat and in both layers of the middle coat. By means of hot alcohol, I have repeatedly extracted cholesterine and oleine from all these parts separately, and from various arteries; and in one instance from the outer sheath of the aorta.

The preceding observations appear to give the following results:—

1. The white or buff-coloured opaque spots of the inner membrane of the arteries are of a fatty nature.

2. The soft matter, which has been generally called atheroma, and which often collects between the inner and middle coats, is also fatty.

3. The fatty matter is frequently found in the substance of both these coats.

4. A fatty degeneration of the tunics of the arteries is generally connected with that state of them which is the most frequent cause of aneurism, as well as of their obstruction, occlusion, or wasting, in aged people.

5. The matter usually contains cholesterine and oleine, and often some margarine.

6. The tunics of ossified arteries, as well as the bony plates, are often pervaded by the fatty substances just mentioned.

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The fatty specks of the lining membrane are sometimes seen before the age of puberty, and the extension of the fatty disease to the middle coat, and the accumulation of the matter between these tunics, may be often observed before forty. It is about this time of life, and subsequently, that the fatty disease of the tunics is probably the most common cause of those spontaneous ruptures of arteries which so frequently produce sudden death. The decay of the arteries, as age advances, has been almost exclusively attributed to the accumulation of phosphate of lime in their tunics. My observations lead me to infer that the formation of fatty matter in the coats is as generally connected with the change.

It might be supposed that a fatty degeneration of the arteries has been generally recognised, as the epithet steatomatous has been so often applied to them by pathological writers. I cannot find, however, that it has been at all used in strict accordance with its etymological import; and some of the best observers do not consider the morbid production in question as fatty.* It has been regarded as imperfectly organized fibrine;† and a French author,‡ after expressing his opinion that there is not much

* Craigie, General and Pathological Anatomy, Edinb. 1828, p. 97. Otto, Pathological Anatomy, translated by South, Lond. 1831, p. 331 and 332.

† Hope on the Diseases of the Heart and great Vessels, Lond. 1839, p. 223.

‡ P. H. Berard, Dictionnaire de Médecine, tom. 4. Paris, 1833, p. 133 and 134.

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difference between the matter called steatomatous and that of atheroma, remarks how desirable it is that we should be informed, from accurate analysis, whether there be any relation between these two morbid productions and tubercle. In short, morbid states of the arteries have been denominated steatomatous, just as vaguely as other diseases have been called caseous, colloid, encephaloid, &c.

The situation of the disease spoken of as steatomatous is by no means clearly defined; for while it has generally been understood to be contained between the middle and internal coats of the artery,* some authors† have described the affection as seated in the latter coat, or at least as distinct from atheroma; and certain tumours or growths projecting into the cavity of the vessel have received the appellation of steatoma.‡

It appears to me, that as the importance of fatty degenerations has never been fully recognised, so their frequency and precise nature has escaped investigation. My observations lead me to infer that certain animal tissues are not more commonly weakened and obstructed by the anormal presence of

* Alex. Monro, Medical Essays and Observations, 4th ed. Edin. 1752, p. 237. Cruveilhier, Dictionnaire de Médecine et de Chirurgie Pratiques, Paris, 1829, tom. 3, p. 397.

† Scarpa, Treatise on Aneurism, translated by Wishart, 2nd ed. Edin. 1819, pp. 88-89. Hodgson, on the Diseases of Arteries and Veins, Lond. 1815, pp. 15-16.

‡ Stenzel, De Steatomatibus in Aorta repertis. (Haller, Disp. Morb. 2, 527.) Wittemberg, 1723.

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phosphate of lime than by that of fatty matter. The premises on which this deduction is founded having been given as far as regards the arteries, it remains only to add a few brief remarks on some other parts.

We never hear of fatty degeneration of the testicles, of the kidney and other glands, of the lungs, of the blood, &c.; yet these affections are rather common in a variety of chronic diseases, especially of old people, and often in connection with great general emaciation.

In wasting of the testicle, and when the functions of that gland are impaired by lingering diseases or old age, the seminal tubes are often more or less obstructed by fatty matter, which occurs in free globules, and in more equal sized and minuter molecules, generally aggregated into comparatively large rounded or irregular masses, nearly opaque, and of a brown or dull yellowish colour. There is reason to believe that the molecules of the semen, which I have elsewhere* described as occurring in healthy animals, are of a fatty nature; but these molecules do not form the dark granular masses or corpuscles above mentioned. The seminal tubes of mammiferous brutes, which have died in confinement, are sometimes nearly opaque, in consequence of being obstructed with brown granular fatty bodies.

In every variety of consolidation of the lungs, more or less fatty matter will be found. In ruddy

* Proc. Zool. Society of London, July 26, 1842.

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or red consolidation, the juice chiefly contains pale cells, minute molecules, and a few larger fatty globules. In one case Dr. Davy analysed the pale cells, and concluded that the envelopes contained a large proportion of margarine, and that the molecules were principally composed of oleine. The molecules are probably analogous to the elementary granules of Henle,* which he says are of a fatty nature. How much the molecules differ in size from the larger fatty globules will be seen by a reference to figures 5 and 7. In brown and lead-coloured consolidation of lung, the fatty matter is generally still more abundant than in the red variety, and occasionally in sufficient quantity to grease paper when dried and heated on it. In this form of pneumonia the chief constituents of the juice are dark granular corpuscles, minute molecules, and a few fatty drops. The corpuscles are very variable in magnitude, but frequently about $\frac{1}{1300}$th of an inch in diameter; they appear dark when viewed by transmitted light, because they are nearly opaque, for they have a lighter hue when seen by reflected light. They are made up of the molecules, and occasionally include much larger fatty globules. There is reason to believe that they are principally composed of oleine. Dr. Davy examined a part of the lung from which figure 8 was made, and found the fatty matter to be chiefly oleine, with a very small proportion of margarine. He concluded that the molecules were composed of oleine.

* Anatomie Générale, traduit par Jourdan, Paris 1843, p. 161.

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The foregoing observations, and a comparison of the pale cells of red pneumonia with the dark granular corpuscles of brown pneumonia, as depicted in figures 7 and 8, will show that these two morbid states differ in more respects than in colour. But as the brown and red varieties are apt to be intermingled, so the particles of each will often occur together. The brown consolidation of lung commonly exists in phthisis, and is not at all infrequent independently of tubercular disease.

In gangrene of the lungs, and in inflammation of the black lungs sometimes seen in old persons, fatty globules are generally rather numerous. Some of them are frequently contained in corpuscles like epithelial cells, of which examples are represented in the upper part of figure 5, from ruddy consolidation. Hence it would appear probable that, in some cases, the fatty substance may be secreted or separated from the blood by cells, and not merely derived from it by exudation through the vessels, a circumstance of some interest in relation to the recent doctrine of the ultimate secreting structure.*

The fatty condition of the liver, so well known in pulmonary consumption, has usually been considered as a consequence of impaired respiration. There are some facts, especially those afforded by

* See Henle, Anatomie Générale par Jourdan, p. 211. Goodsir on the Ultimate Secreting Structure, Trans. Roy. Soc. Edin. vol. 15. Carpenter on the Origin and Functions of Cells, p. 23, from Brit. and For. Med. Review, No. 29.

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comparative anatomy, favourable to this view. Yet it has appeared to me, after numerous observations, that the quantity of fatty matter in the liver, as a product of disease, is not regularly increased in proportion to the diminution of the special function of the lungs. I have often found the fatty matter of the liver scarcely exceeding the healthy standard in cases where there was the most extensive tubercular disease of the lungs; and in several other chronic diseases there was an excess of fatty matter in the liver, although the lungs were nearly healthy, quite free from tubercle, and only slightly inflamed. In children cut off by various chronic maladies, but quite free from pulmonary consumption, the liver is not uncommonly surcharged with fatty matter. When this matter is in excess, although plentifully contained in the microscopic cells, as shown by Mr. Bowman,* I have generally found it chiefly accumulated in the interlobular fissures and spaces described by Mr. Kiernan,† or at least around the surface of the lobules, where it forms a distinct buff-coloured boundary to each of them. The ruddy-coloured hepatic lobules appear to diminish in size as the paler fatty substance increases. In a few instances it was principally seated in the centre of the lobules.

Several months after the foregoing paper was read before the Society, I had an opportunity, for the first

* On the Minute Anatomy of Fatty Degeneration of the Liver: Lancet, 1841-42, vol. i. p. 560.

† Phil. Trans. 1833.

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time, of consulting the excellent work on Pathological Anatomy by Dr. Hasse,* from which the following passage has been obligingly translated for me by my friend Dr. Willis:—"Bizot often observed in it (atheromatous matter) shining bodies like gold dust, (Gold pulver,) and Cruveilhier saw aggregations which resembled in all respects the plates of cholesterine of many gall-stones. These masses have been examined by Gluge† microscopically, and found to consist of aggregations of fat globules."—*Hasse*, p. 98. I have neither seen M. Gluge's work, nor the observations above referred to of M. Cruveilhier.

Explanation of the Figures illustrative of Mr. Gulliver's Paper on Fatty Degeneration of the Arteries, &c.

PLATE I.

The objects in the two first figures are magnified about 370 diameters, and about 800 in all the other figures. The relative sizes of the objects are preserved; and their actual sizes, in the last six figures, may be estimated by the scale, which represents micrometrical spaces of $\frac{1}{4000}$ of an English inch.

Fig. 1.—Thin pulpy matter from between the

* Specielle Pathologische Anatomie. Von Dr. Karl Ewald Hasse. Leipzig, 1841.

† Anatomisch-mikroskopische Untersuchungen, 1839. Heft 1. s. 130.

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inner and middle coats of the aorta. From a man aged 78, who died of pericarditis and hydrothorax.

Fig. 2.—Thicker pulpy matter, from the same situation in the aorta. From a man aged 94, who died of pneumonia. The two preceding figures are fully explained at pp. 86, 87.

Fig. 3.—Left part; fatty globules in an opaque spot of the inner membrane of the aorta, which had longitudinal streaks of such spots opposite to the origins of the intercostal arteries. From a man aged 21, who died of typhus fever. Right part; fatty globules, many of them in streaks, and crystals of cholesterine, in a whitish speck of the inner membrane of the arch of the aorta. From a man aged 32, who died of an injury of the leg.

Fig. 4.—Fatty globules and crystals of cholesterine in whitish opaque specks of the basilar artery. The disease affected both the inner membrane and the circular fibres of the vessel. Many of the minute branches of the cerebral arteries were similarly diseased. From a man aged 60, who died suddenly of extravasation of blood in the brain.

Fig. 5.—Fatty particles in ruddy consolidation of lung. In the upper part of the figure they are represented in cell-like objects; in the lower part, free fatty globules or drops are seen. From a woman aged 27, who died of pneumonia succeeding to old pericarditis.

Fig. 6.—Fatty matter in reddish brown consolidation of lung. In the upper and left part, fatty globules in the shapeless fragment of a clot; to the

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right, a portion of fatty matter not quite globular. In the lower part, three granular corpuscles composed chiefly of minute oily globules. From a boy aged 12 months, who died of pneumonia.

Fig. 7.—Pale cells and minute molecules in red consolidation of lung. The upper half of the figure from a woman aged 42, the lower half from a woman aged 95, both of whom died of pneumonia.

Fig. 8.—Dark granular corpuscles, a multitude of isolated molecules, and some larger fatty globules, in brown or lead-coloured consolidation of lung. From a woman aged 24, who died of phthisis. The lung contained a great quantity of tubercle; the intervening tissue was much consolidated.

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REMARKS

ON THE

CALCULI

IN ST. GEORGE'S HOSPITAL.

By HENRY BENCE JONES, M.A., Cantab.,

LICENTIATE OF THE ROYAL COLLEGE OF PHYSICIANS.

Communicated by CÆSAR H. HAWKINS, Esq.

READ FEBRUARY 28th, 1843.

The following paper is the result of an analysis of a collection of calculi, most of which were presented by Sir B. Brodie to St. George's Hospital. The collection now consists of 233 divided calculi, not including any duplicates, and 9 undivided, these last having some peculiarity in form. The analysis was begun in 1831 by Dr. Prout, who examined 24 specimens, and from these as well as from the remainder which I have analysed, I shall endeavour first to show that when the urates are deposited there is reason to suppose that little or no free acid can exist in the urine, and that consequently alkalies, however useful they may be in other respects, are not requisite in such cases to remove acidity. When we find an acid reaction on test paper, it is by no means a

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true conclusion that therefore free acids exist, and alkalies must be given to remedy this state of disordered secretion. As far as we yet know, the truth appears to be, that free acid is not usually present, and that consequently alkalies are generally not required to neutralize acidity in the urine.

I will secondly point out in what proportion of cases in this museum acid injections might have dissolved or partially removed the calculus.

Of those calculi which have been divided,

46 are simple, that is, consisting throughout of one substance.

40 are compound, consisting throughout of a mixture of two or more substances.

147 are alternating.

Of these alternating calculi,

83 have a simple nucleus.

58 have a compound nucleus.

If, instead of looking at the calculi from this point of view, we examine them for the purpose of seeing how often the same substance forms either a whole calculus, or occurs in a well-marked layer, we shall find that in this collection there are at least 450 distinct deposits. These I have arranged in the accompanying Table, from which it will be seen that

135 times uric acid occurs either alone or mixed with other substances.

222 — urate of ammonia, ditto.

163 — oxalate of lime, ditto.

139 — the phosphates, ditto.

80 — urate of ammonia with oxalate of lime.

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TABLE of 233 Calculi examined. These consisted of at least 462 well-marked Layers, of which 450 may be thus arranged.

PROBABLE STATE OF SECRETION.	URIC ACID.	URIC ACID & OXALATE OF LIME.	OXALATE OF LIME.	PHOSPHATES.
1st. Urine acid to test paper.				
When enough free acid is passing to decompose all the urate of ammonia.	All Uric Acid = 89	Uric Acid and Oxalate of Lime = 8	Oxalate of Lime	None
When little acid only passes, and the urate of ammonia is only partly decomposed.	Uric Acid & Urate of Ammonia = 31	Uric Acid, Urate of Ammonia and Oxalate of Lime = 7	Oxalate of Lime =59	None
When there is no free acid passing, and hence none of the urate of ammonia is decomposed.	Urate of Ammonia = 61	Urate of Ammonia and Oxalate of Lime = 56	Oxalate of Lime	None
2nd. Urine not acid to test paper.				
When there is an alkaline state of the urine from want of acid, or from excess of alkalies taken as medicines, or formed from urea.	Urate of Ammonia and Phosphates = 50 Fusible . . . .=47 Phosphate of Ammonia & Magnesia . .=2 Phosphate of Lime =1 50	Urate of Ammonia, Phosphates & Oxalate of Lime=17 Phosphates mixed .=9 Phosphate of Ammonia and Magnesia . . .=3 Phosphate of Lime .=5 17	Phosphates and Oxalate of Lime=16 Phosphates mixed .=7 Phosphate of Ammonia and Magnesia . . .=2 Phosphate of Lime .=7 16	Phosphates only=56 Phosphates mixed .=38 Phosphate of Ammonia and Magnesia . .=10 Phosphate of Lime = 8 56
	Nature of deposit on Calculus when there is a tendency to an excess of urates, in proportion to the water.	Nature of deposit on Calculus when Oxalate of Lime is formed, and the urates are in excess.	Deposit when Oxalate of Lime only is formed, and no urates in excess.	Deposit when no Oxalate of Lime is formed, and no urates are in excess, and no free acid is present.

Of Twelve Layers not included in the above Table,
10 contained Carbonates
2 Uric Acid and Phosphates (Dr. Prout).

12

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In order that a deposit of urate of ammonia or of uric acid, with urate of ammonia, may take place, it is necessary that an excess of urate of ammonia, as compared with the quantity of water, should exist in the urine; yet this is not the case as regards a deposit of uric acid alone. It will be shown that for uric acid to be precipitated, no other unnatural state need be present except that of some free acid passing in excess out of the system. In this, perhaps, we may find a partial explanation of the frequent occurrence of uric acid calculi.

Urate of ammonia appears to be increased in the urine from very slight causes. The very frequent occurrence of this deposit in the state of health rendered it very probable that this substance would be often found as a constituent of calculi. Since Dr. Prout first proved its existence, other chemists have repeatedly recognized it, and this collection is not singular in the number of calculi which contain urate of ammonia.

Oxalate of lime appears from the above Table to exist with uric acid, with urate of ammonia and with the phosphates. It occurs 80 times in 450, with urate of ammonia forming a distinct deposit. As these substances occur together so often in calculi, so must they frequently be met with in the same sediment: that is, there must be a certain diathesis, in which urate of ammonia is formed at the same time with oxalate of lime. By means of the microscope this can be shown to be true. And in the red deposit of rheumatism and of indigestion

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I have found octohedral crystals of oxalate of lime, sometimes in large quantities. This mixed diathesis I hope soon to bring again before this Society.

In order to arrive at the state of the secretion when the substances in the above Table were deposited, we must consider, with Dr. Prout, that urate of ammonia exists in the urine in the state of health. The rapid deposit of this substance when urine is evaporated under the air pump over sulphuric acid, and the change which ensues if even carbonic acid is first passed through the liquid, admits of no other conclusion than that uric acid exists in healthy urine combined with ammonia. And as we find by experiment that all acids, even down to carbonic acid, are capable of causing a deposit of uric acid, and that when acids are added in small quantities an equivalent quantity of uric acid is deposited, and if much acid is present, that all the uric acid is thrown down, and that no urate of ammonia is left undecomposed; it appears that free acid and urate of ammonia cannot exist for any length of time in the same solution. We find, moreover, that urine which reddens litmus, when cool, deposits urate of ammonia, and after being again heated and cooled, again deposits the same substance; and that however often this be repeated, no decomposition takes place, no uric acid crystals can be detected by the microscope; whence we must conclude that whilst urate of ammonia only is deposited, no free acid can be present, although litmus paper may be reddened.

We may make satisfactory experiments on this

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subject in the living body. To a patient who passes urate of ammonia, we may give acid medicines and cause a deposit of uric acid in its place, whilst litmus paper will be far more strongly reddened than it previously was.

For the above reasons, therefore, it seems most probable that when uric acid alone is deposited, much free acid must have been thrown out by the kidneys, and that thus all the urate of ammonia, which would otherwise have been present, must have been decomposed. If we wish to know how often in calculous complaints this highly acid state of secretion occurred, we must not only observe how often whole calculi consist of uric acid, but how often whole layers of this substance occur. This appears from the Table to have been 97 times in 450.

It was above stated that when little acid was added to urine or taken by a patient subject to a deposit of urate of ammonia, that substance was only partly decomposed; and the conclusion which must be drawn from this seems to be, that when urate of ammonia is found mixed with uric acid, but little free acid is secreted by the kidneys. Such a mixture was found to occur in 38 layers. Hence in 38 states out of 450, but little free acid was thrown off in the urine.

When we find urate of ammonia alone, without any uric acid, forming a calculus or layer, we must consider that no free acid was removed by the kidneys, although the secretion may have been acid to test paper.

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The presence of the phosphates in a deposit generally implies a neutral or alkaline state of the urine. If such be the case, and the presence of uric acid implies an acid state from free acid, it would follow that uric acid and the phosphates must exist very rarely in the same deposit. When the calculus has consisted chiefly of the phosphates, I have not once found uric acid to exist with it. When traces of this acid have been present, careful examination showed it was in combination with some base. And when the calculus consisted chiefly of uric acid, the small ash which sometimes remains will rarely be found to consist of the phosphates.

In the above Table the phosphates occur 139 times. Hence 139 times in 450 the urine must have been neutral or alkaline to test paper.

If then phosphates indicate neutrality or alkalescence, and uric acid indicates free acid in the urine, we may conclude that the deposit of oxalate of lime, as it occurs in the above Table with uric acid, with urate of ammonia and with the phosphates, is independent of acidity and alkalescence, and that its presence in a layer does not indicate any particular state of the secretion.

Now, as such layer implies a certain state of the urinary secretion, the 450 layers may be taken to represent 450 states of the urine.

139 of these were neutral or alkaline, as so many times the phosphates are found to occur.

311 were feebly or strongly acid to test paper.

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Of these 311, in 97 much free acid was passing from the system, as so often layers of uric acid occur.

38 but little free acid was thrown out, as so often mixed layers of urate of ammonia and uric acid appear in the Table.

117 no free acid passed, although litmus was reddened.

59 the state of the secretion is unknown, the oxalate of lime not offering any indication of it.

Omitting these 59 oxalate of lime, there are then 117 states in which no free acid is passing from the system, and 135 in which little or much free acid was thrown out. From this it appears that in 252 cases of the uric acid diathesis, there were 187 in which no free acid was passing, and in these, alkalies would be of no benefit, so far as neutralising free acid in the urine is concerned: that is, in nearly every second case of the uric diathesis, there was but little if any free acid in the urine to be neutralised.

In only 97 cases out of 252 was there much free acid secreted, or only twice in five cases were alkalies very necessary to remove the acidity of the urine; though in other cases these medicines might have been beneficial in some other respect.

There are two points in my analysis which I have found difficult of determination, when only a small quantity of the calculus or layer could be spared.

The first, which is rare, is, to distinguish between

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a mixture of urate of ammonia with oxalate of lime, and urate of ammonia with urate of lime. The other is to recognise a mixture of uric acid with urate of ammonia. There is no difficulty in either case when a sufficient quantity of the calculus can be spared. The microscope, which in fresh sediments on the last question is most satisfactory, with the powder of calculi has afforded me no assistance.

In 40 cases the phosphates or the phosphates and carbonates form the last layer.

In 7 cases the whole calculus consisted of fusible deposit.

In 5 cases the whole calculus consisted of phosphate of ammonia and magnesia.

In these 52 cases out of 233, the calculus might have been lessened by the injection of dilute acids, and in 12 out of these the whole calculus might have been removed. This supposes however that in all these cases the calculi were in the bladder, and not in the kidneys, on which there is no satisfactory historical evidence.

In addition to these 52 cases there are 6 calculi which consist entirely of urate of ammonia and fusible deposit, and 19 in which fusible and urate of ammonia form the outside layer. In these cases, most probably, any acid injection would dissolve the fusible and decompose the urate of ammonia, and thus disintegrate the calculus. So that altogether in 75 out of 233 a solvent might have assisted in the removal, although in 18 only out of 233, or

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about 1 in 13, could the calculus have been entirely removed. For this Sir B. Brodie has shown dilute nitric acid sufficient. Perhaps at some future time lactic acid, which possesses a peculiar power of dissolving the phosphates, may be found even more rapidly efficacious.

APPENDIX.

Since the foregoing paper was written, I have been examining a small collection of between twenty and thirty calculi, chiefly removed by Mr. Cæsar Hawkins.

The first of these was a small calculus about the size of a large nut, which had been divided: the section showed a large nucleus with a few thin layers around it. The nucleus was dirty yellow, semi-transparent, crystalline, irregularly radiated, and rather soft. The external layers were much harder, whiter, and less crystalline. The nucleus entirely disappeared with heat, giving a most disagreeable and peculiar smell; it dissolved with little difficulty in nitric acid with effervescence, and when evaporated afterwards to dryness, it left a black residue, which ammonia did not alter. A little of the powder from the nucleus was boiled with water in a test tube: to this a drop or two of a solution of acetate of lead was added, and then an excess of caustic potash.

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On boiling, this mixture became in a few minutes jet black. This proof of the presence of sulphur was conclusive as to the nucleus of this calculus being cystine.

The layers exterior to this nucleus contained no cystine; when treated with nitric acid they gave evidence of uric acid, which was combined with ammonia, being soluble in water, and evolving ammonia when heated with liquor potassæ. By heat, a considerable residue was left, which dissolved with effervescence in dilute acids, and afterwards gave a larger precipitate of lime. By long-continued heat an alkaline ash remained. Hence the external part of the cut surface consisted of urate of ammonia and oxalate of lime.

The external surface of this calculus also appeared to consist of two substances, a white crystalline superficial part, and an inferior brownish yellow substance. The first consisted of crystals of oxalate of lime, the second of urate of ammonia and oxalate of lime.

Hence the cystine deposit continued for a considerable time, and was succeeded by urate of ammonia and oxalate of lime for a comparatively short time, and this was followed for a still shorter period by oxalate of lime alone.

Through the kindness of Mr. Hawkins I am able to give the history of this calculus, which he removed from James Roberts, 6¼ years old, at the Asylum for the Recovery of Health, in 1828. The boy had suffered from symptoms of calculus for

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four years. The pain occasionally was so great that he was held up by his feet to give him relief. The operation was performed on the 25th of October, and the wound healed on the 6th of December. He returned to Cornwall, and nothing has since been heard of him.

This case proves the existence of a deposit of cystine so early as two years of age. It has not as yet been found in a patient of more than 47 years. Of the ten cases recorded by Dr. Prout, eight occurred between 47 and puberty. One before 12 years of age, and one before the patient was five years old.

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CASE

OF

ULCERATION OF THE INTERNAL JUGULAR VEIN,

COMMUNICATING WITH AN ABSCESS.

By WILLIAM BLOXAM, Esq.,

SURGEON TO QUEEN ADELAIDE'S LYING-IN HOSPITAL, AND LECTURER ON MIDWIFERY AT THE SCHOOL OF ANATOMY AND MEDICINE ADJOINING ST. GEORGE'S HOSPITAL.

COMMUNICATED BY SAMUEL LANE, Esq.

READ FEBRUARY 28TH, 1843.

As the following case appears to be one of an unusual character, if not unique, I take the liberty of presenting it to the notice of the Royal Medical and Chirurgical Society.

On the 20th of October 1842, I was requested to visit a child in the neighbourhood of Golden Square, who had been under the care of a medical gentleman for three weeks previous with an attack of scarlatina. On the decline of the eruption, one of the glands on the right side of the neck, under the angle of the jaw, became inflamed, and suppurated freely.

This abscess had opened itself externally for five days, when a discharge of blood took place from the aperture, small at first, but becoming gradually more copious and of a venous character.

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Three days after the first appearance of the blood I saw the case.

The child, five years of age, was very pale; indeed, I might say almost exsanguine; her pulse rapid, extremities cold, and the hæmorrhage existing to a great extent. This was much aggravated by coughing or moving, and being a child of extraordinarily irritable temper, every time she was excited the blood poured forth in an alarming manner.

Having consulted with the gentlemen who were in attendance on the case, we agreed to plug the abscess with lint, and to endeavour to restrain the bleeding by pressure.

This was done: a graduated compress and roller were applied, and the hæmorrhage then ceased, and did not return for twelve hours; when, in the evening, the child became very restless and intractable, and consequently the hæmorrhage recurred: and, though the compresses were several times re-adjusted, she was so irritable that they were almost immediately displaced.

This state of affairs continued from time to time, and the child died on the fifth day from the first occurrence of the hæmorrhage.

On examining the neck after death, an immense quantity of semi-coagulated blood was effused beneath the integuments of the throat and fore part of the chest.

The abscess was carefully laid open, and the internal jugular and carotid artery were transversely

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divided some distance lower down the neck; and on passing a probe upward to the abscess, an ulceration of an oblong shape, of about five lines in its long axis, was observed in the inner side of the internal jugular vein, opening immediately into the sac of the abscess.

The perforation, which may be seen in the preparation accompanying this paper, furnishes a satisfactory explanation of the source and quantity of the hæmorrhage.

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SOME ACCOUNT

OF AN

HYSTERICAL AFFECTION OF THE VOCAL APPARATUS,

WITH SEVERAL CASES.

By OSCAR CLAYTON, Esq.

READ MARCH 14TH, 1843.

THE cases I have ventured to lay before the Society occurred in a charitable institution for the maintenance and education of female children from the age of nine to fourteen, and may, perhaps, derive interest from their having been observed and treated with the strictness so difficult to accomplish, except within the walls of a public institution.

The cases, seventeen in number, occurred in two groups; the first commencing in February 1841, preceded by well-marked pyrexial symptoms; the second in October last, in which the hysterical and imitative character was evident from the first. The children attacked were from eleven to fourteen years of age.

In February 1841, one, and shortly afterwards seven of the children were attacked as follows—

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with a short and almost constant hacking cough, with much pain and distress in breathing, but no expectoration; quick pulse, hot skin, white tongue, and costive bowels. After two or three weeks, during which time these symptoms withstood all the remedies applied, the cough changed to sounds varying in the different patients; in some, resembling the double action of a large saw; in two, a shrill screaming expiration, following a quick catching inspiratory effort, much resembled the cry of a peacock; in another, the sound was such as is produced by blowing into a small metallic tube. In fact, it is difficult to conceive the dissonance and constancy of these sounds.

Besides these, one girl, aged fourteen, became affected, at the same time, with symptoms exactly resembling those of laryngitis, and requiring the usual means for their removal; but they were followed after a week or two by the sounds above described.

In the commencement, sinapisms, blisters, combined with the administration of expectorants and sedatives, with and without the addition of antispasmodics, were tried without avail. A combination of extract of hemlock, sulphate of zinc and of quinine was given, as well as full doses of sesquioxide of iron, when the anomalous sounds were established, which produced no effect, although continued for a considerable period, until the children were separated one from the other, when with the exception of two, who were sent to their homes

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in order to more perfect separation, they slowly recovered.

In the following October 1841, some indications of a return of the symptoms was manifested in three of the children, but the same remedies, combined with separation from each other, were shortly successful in arresting the attack.

No further occurrence of these symptoms took place till October 1842, when a considerable number were attacked. The symptoms, although commencing with the short hacking cough, and attended with some slight pyrexial symptoms, were almost immediately followed by the double sounds before described, and the hysterical and imitative character was well marked from the beginning. The uproar in the building now became alarming to the neighbourhood, and from the loudness of the sounds it became difficult to separate the patients effectively. No remedial means, including turpentine, spiritus ammoniæ succinatus, anti-spasmodics, tonics, mineral, as well as vegetable, combined with the regular use of the shower bath, being, after long continuance, found of any use, I determined to try the effect of a strong mental impression; and, following the plan adopted by the celebrated Boerhave, in the House of Charity, at Häarlem, I assembled the children, and informed them, that I must apply a red-hot iron to the throats of all who were not quite well on the following morning. This alarmed them so much that, with the exception of two of the elder girls, they ran away to their respective

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homes on the following day, whence they returned on the day after quite well.

The two remaining, still made the same noise, in which they were again joined by the others in little more than a week. All other means failing, their throats were blistered by means of a spatula, covered with a silk handkerchief and heated in boiling water. This with some, succeeded in removing the symptoms; in two, who were carefully secluded from the rest, the affection gradually wore out; but two others were at last obliged to be sent to their homes, where, separated from their noisy companions, they soon recovered.

In reviewing these cases, it seems worthy of remark, that in two of them where illness of another kind supervened, the noise ceased.

This affection, like most of the hysterical family, although for the most part involuntary, still to a certain extent was controllable by a strong effort of the will; although such effort was extremely painful, giving rise to spasmodic catchings of the breath. Not that I believe these children were guilty of any trick, but that, on the contrary, they were very glad to be relieved.

The rapidity with which the cases succeeded each other, proves that imitation was their main cause, and the success of separation, and the comparative failure of other means, still further strengthen this supposition.

Although, doubtless, not absolutely novel, I have ventured to give the detail of the history and treat-

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ment of these cases to the Society, chiefly on account of their number, of their having occurred in one establishment, and as affording a means of judging of the varied treatment adopted with perfect strictness and perseverance.

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CASE

OF

ERECTILE TUMOUR

IN THE POPLITEAL SPACE.—REMOVAL.

By ROBERT LISTON, Esq., F.R.S.,

SURGEON TO UNIVERSITY COLLEGE HOSPITAL.

READ MARCH 14TH, 1843.

CHARLES REASON, æt. 10, admitted into University College Hospital, January 2, 1843, under Mr. Liston, is a stout, remarkably healthy looking lad, an errand boy, residing in the county of Essex. He has always enjoyed good health. He was sent to the hospital on account of a swelling in the right ham, which first attracted attention about eight years ago. It was then of small size, and appeared to occasion the child no inconvenience. It continued gradually, though slowly, to increase, and about a year subsequently to its first discovery his mother showed it to a surgeon.

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At this time it is stated to have been as large as a turkey's egg, elastic to the touch, and to have had a distinct pulsation, but no '*bruit*' could be heard. A grooved needle was passed into it "very deeply," to use the words of the surgeon who saw the case, but without being followed by the escape of any fluid, either pus or blood.

The disease continued slowly to increase, but still occasioned no inconvenience. About three years ago a seton was passed through a portion of it, and retained some days. A discharge having been established, the seton was withdrawn, when the openings soon healed. This proceeding had no effect in diminishing the size of the swelling. The application of blisters and iodine was now had recourse to, but equally without effect. The tumour, in fact, has been gradually enlarging up to the present time. No pain whatever has been experienced till within the last few months, and then only occasionally. The boy cannot give a very distinct account of his sensations, but says, "his leg sometimes pains him."

There is now a tumour of an oval shape, the long diameter being in the direction of the axis of the limb, situated in the upper part of the right popliteal space.

The swelling is about 3½ inches in length. The integuments covering it are not inflamed or discoloured, but perfectly natural. No pulsation is perceptible in it, nor can any '*bruit*' be detected by the ear. The pulsation of the artery can be felt in the

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popliteal space below the tumour, and those of the anterior tibial of the affected limb are natural. No pain is complained of in the limb at the present time, and there is no tenderness of the parts on handling them. The temperature is the same as that of the opposite side.

The tumour itself has a doughy, elastic feel, giving, when the limb is extended, a sensation much resembling the fluctuation that is produced by deeply-seated matter. When the limb is flexed, however, this sensation is less distinct, and the tumour has more the feel of an elastic solid mass, which is pretty moveable, and may be distinctly raised and separated from the bone.

Mr. Liston entertained the opinion that it was a solid tumour, possibly of a fatty nature, and decided upon its removal. In this opinion Messrs. Quain and Morton coincided.

Operation, Jan. 6th.—The patient was placed on the operating table on his face. Mr. Liston then proceeded to make an exploratory puncture into the tumour. This was done by introducing a narrow bladed bistoury at the most prominent part of the swelling, nearly in the centre of the limb, and towards the upper part of the popliteal space, deeply into the mass, turning it half round on its axis, and then withdrawing it a little. This was followed by a stream of dark-coloured blood projected with some degree of force, which, however, gradually became less. The blood still continued to flow copiously, but uninterruptedly, and without any jerking.

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On attempting to move the point of the knife laterally, it was found not to be loose, showing that it had not entered any cavity. The tumour diminished somewhat in size during the escape of the blood, which might have amounted in quantity to three ounces.

It was suggested by Mr. Quain that possibly the bleeding resulted from the external saphenous vein being wounded, as in a not uncommon variety it enters the deep vein much higher than usual, in which case its situation would not be far distant from the point of puncture. The bleeding from the opening was stopped by the finger, and a second puncture made on the outer side of the tumour. This was not followed by any bleeding. Mr. Liston determined on removing the morbid growth. A free incision was made through the skin to the extent of about four inches. It was not adherent to the deeper parts. The fascia was now divided to an equal extent, and the surface of the tumour exposed. It had much the aspect of a fatty tumour, but its size was evidently much less than before the commencement of the operation. The opinion that the vein had been opened was now seen to be incorrect.

The dissection was commenced on the outer side. The popliteal nerve was soon exposed, and the tumour, which was slightly adherent to it, carefully removed from it. After a troublesome dissection deep into the popliteal space, the tumour was found to be covered by muscle. The dissection was next

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proceeded with on the inner side, when it was soon found to be in like manner covered by muscular tissue, which was seen to be the semi-membranosus muscle embracing the tumour. During the manipulations necessary in this dissection the tumour has become much smaller than when first exposed on the division of the fascia. The substance of the semi-membranosus muscle was now cut into, and the morbid growth removed. The popliteal artery was not exposed in the course of the dissection. Only one vessel required ligature, and the patient was carried to bed, the wound being covered with lint dipped in cold water. A good deal of blood was necessarily lost during the operation, and the boy was somewhat faint.

About three hours after the operation, some hæmorrhage occurred from the upper extremity of the wound, proceeding from a vessel very deeply situated. As the patient was still in a state of faintness, no attempt was made to secure the vessel, but the wound was plugged with dossils of lint. This effectually stopped the bleeding, and it did not recur. The limb was placed in a semiflexed position supported by pillows.

The lad gradually recovered from the state of faintness without the use of any stimulants. On the day following the operation he was doing well, and without bad symptoms of any kind.

Jan. 11th.—The lint having now become quite loose, it was removed, and the wound dressed with zinc lotion.

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Jan. 12th.—Edges of wound slightly approximated by means of a roller lightly applied.

Jan. 14.—Wound granulating well, and diminishing in size. The boy was directed to straighten the limb as much as possible, to prevent permanent contraction.

Feb. 1st.—The wound has been steadily filling up, and nothing now remains but a superficial sore. This looks healthy, and is cicatrizing fast under the use of the lotion. The lad walks about the ward, and has the complete use of the limb.

Examination of the Tumour.—On making a section, the tumour was found to consist of a mass of most perfect erectile tissue as large as a hen's egg. This was completely surrounded by condensed cellular and fatty matter. One part of the erectile tissue was more condensed than the rest, possibly where the seton had traversed it.

Microscopic examination of the Tumour.—Under a low power it appeared to consist of an interlacement of columns having a fibrous aspect, covered by a smooth membrane, and representing in miniature the appearance of the musculi pectinati of the auricles of the heart. Thin valvular projections of the smooth investing membrane partially closed some of the openings between the columns. Small vessels, filled with blood, were seen running in the substance of the columns. The intimate structure of these columns, examined under a higher power, was seen to consist of bundles of waved parallel filaments. The surface of the columns was covered by a deli-

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cate squamous epithelium resembling that found on the inner surface of veins. No fibres resembling those of elastic tissue could be detected.

The foregoing case is submitted with great deference to the Society, as exhibiting (in the author's opinion) some points of interest. The difficulty of forming a correct diagnosis, it may, perhaps, be admitted was considerable. The tumour occupied an important locality. It had at one time pulsated distinctly, but on the other hand it had been punctured, and a seton had been passed through the morbid mass without any considerable flow of blood having taken place.

It communicated in some degree the feeling of an encysted swelling. The duration of the disease forbade the idea of its being a chronic abscess; but it might possibly have been a cyst containing glairy or other fluid. This cyst might have been supposed to be either single or multilocular. It was, however, thought to be a solid or sarcomatous tumour of some kind, and its removal was determined upon.

The exploratory punctures made in the operating theatre did not throw much light on the case, excepting in so far that confirmation was given to the notion of the swelling being solid. The second puncture must have somehow passed the mass of erectile tissue, and entered only the surrounding fatty matter.

The considerable decrease in the size of the swelling after the incisions was not a little puzzling.

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Besides this, the appearance of the tumour, covered on all sides by muscular fibres, added much to the uncertainty and difficulty of diagnosis in the case.

The bleeding during the operation itself was inconsiderable, and but one vessel required ligature after its completion. There was, indeed, some considerable hæmorrhage a few hours afterwards, but this was easily arrested by pressure, in consequence unquestionably of the disease having been removed or cut *out* and not cut *into*.—The difficulties and dangers of the case would probably have been much increased, and the result might possibly have been very different, had the erectile tissue been encroached upon during the operation.

The case, it is presumed, is a rare and uncommon one. Erectile tissue is not often met with in parts deeply placed, notwithstanding what has been said and written by some observers about its occurrence in bones, &c. &c.

The author is not aware of its having been found in muscular substance. In the preceding case, however, it is more than probable that a small mass of erectile tissue had originally existed in the muscle, and had gradually become developed, till at two years of age it attained such a size as to attract attention.

Structural disease of any kind in muscle is indeed but rarely encountered; and it may, therefore, be permitted in this place to make reference to a case which occurred in the hospital practice of the au-

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thor many years ago, in which the sterno-mastoid muscle was the seat of a tumour of a nature which some respectable pathologists would perhaps class with abnormal erectile tissue. It was certainly very vascular, but contained besides much cancerous looking matter, and was altogether what Mr. Pott might have denominated "a strange distempered mass."

The circumstances of the case are shortly as follows.

The author may be allowed to premise that he would not willingly seek an intimate acquaintance with another such "tumor mali moris," so situated and so connected, notwithstanding the completely favourable result of the operation in the case in question.

Abridged from the Journals of the Royal Infirmary of Edinburgh.

John Ross, æt. about 40, was admitted August 15, 1832, into the Royal Edinburgh Infirmary, with a tumour on the left side of the neck. He has been blind from infancy in consequence of small pox. He is a musician by profession, and has latterly found it inconvenient to place his violin upon his neck, from the position of the tumour.

He states that the present disease has existed

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four years; that when he first noticed it, it was as large as a hen's egg; that he applied oil and hartshorn to it, and thought it became smaller; that it again increased, and at different times he has applied antimonial ointment, mercurial plaisters, and an ointment containing caustic potass, but all to no purpose; that within the last six months it has greatly increased. He is also subject to severe sciatica of the right limb, which has existed for the last six months. Is in rather indifferent health, has profuse sweats, respiration hurried, bowels irregular and costive, pulse pretty good; has an unhealthy aspect; always has some pain in the tumour, but not to any great degree. Deglutition is not impeded by it. He suffers much from the sciatica, and in consequence of it trails his right foot after him. About a month back he had retention of urine, which was relieved by the use of the warm bath and aperient medicines.

The tumour is about the size of a small turnip, but of more irregular figure; it is hard and unyielding; very firmly bound down, and immoveable. It is bounded behind by the trapezius, above by the ramus of the jaw and its angle, below by the clavicle, and to the inner side by the sterno-mastoid muscle. No fluctuation can be felt. The surface of the tumour is not vascular, but there is one discoloured spot caused by the use of potass.

It is doubtful whether or not the sterno-mastoid muscle is involved in the disease, as only the sternal origin can be felt, and then only traced as far as the

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tumour. It is difficult also to say whether any lobes dip down behind the fascia of the neck.

Not being in a good state of health when admitted, he was kept in the house till the 29th, before anything was done to the neck. During this time he had some antimonial ointment applied over the sciatic nerve as it emerges from the pelvis. He had also occasional warm baths and opiates to relieve pain. From these measures he experienced some little relief, and having made up his mind to have the tumour removed, the operation was performed on the morning of August 29.

The operation was commenced by making an incision about two inches from and to the inner side of the acromion upwards to the middle of the ramus of the jaw, and another in the course of the sterno-mastoid, crossing the other at right angles about its middle. The flaps thus formed were dissected back, and the lower origin of the sterno-mastoid divided, this muscle being incorporated with the tumour. The dissection was very difficult, tedious and protracted, in consequence of the firm adhesion of the parts, and of the close vicinity to parts of great importance. The sheath of the vessels of the neck was denuded for at least two inches, and the cervical nerves exposed, and some of them divided. A lobe of the tumour dipped behind the clavicle: this was carefully dissected from the neighbourhood of the subclavian artery. Above, the tumour was attached to the inferior margin of the parotid, and more internally very firmly to the hyoid bone. In

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removing it from this last point, a branch of the superior thyroid artery was wounded, which it was found very difficult to secure, and this could only be done by passing a tenaculum behind the vessel, including the artery and a quantity of the surrounding substance, and then cutting the tenaculum in two, leaving a small portion of it thus fixed.

There was a considerable quantity of blood lost, chiefly venous, perhaps 1½ or 2lbs. Five vessels were secured, the ends of the ligatures being cut off close. The upper angles of the wound were brought together by three sutures, and the lower part filled with lint, at the same time that pressure was made by means of a roller passed over the shoulder and round the waist.

On being raised to be carried away he fainted, but was speedily restored. He was immediately put to bed. A cold perspiration soon broke out, and he complained of his feet being very cold. Warm bottles were applied, and 40 drops of solution of morphia given.

Three o'clock, p.m.—Heat of body returning, and is on the whole as well as could reasonably be expected; he has no very severe pain; pulse rapid and small; no hæmorrhage, but some weeping or serous discharge.

Six o'clock, p.m.—Continues improving; bowels have not been opened since yesterday; ordered to take some tea and eggs; to repeat the anodyne at bed-time, and to have ℥ſs of sulphate of magnesia to-morrow morning, to be repeated if necessary.

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August 30, 7 p.m.—Had a comfortable night; nearly free from pain, and slept for a considerable time; two doses of sulphate magnesia were taken, which produced two evacuations; he complains of some nausea, and slight difficulty of deglutition, and of considerable pain in the leg, but none in the neck; skin moist; to repeat the anodyne at bed-time.

He continued to go on very favourably, taking nourishing diet. On the third day after the operation the sutures and greater part of the lint were removed, and the wound was looking remarkably healthy. The remaining portion of lint was removed on the 5th day. On the 6th day a slight attack of erysipelas of the head and face came on. This was combatted by fomentations, punctures, and antimonial salines, and entirely disappeared in four days. The wound rapidly healed, being dressed in the centre with charpie, and with simple dressing at the edges. The man was discharged perfectly cured on the 17th of October. The sciatica, however, still continued to trouble him much, and there appeared little prospect of his being entirely relieved of that affection.

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TWO CASES OF

OSTEOSARCOMA OF THE THIGH BONE,

REQUIRING AMPUTATION OF THE LIMB IN BOTH INSTANCES.

By R. A. FROGLEY, Esq., of Hounslow.

Communicated by SAMUEL LANE, Esq.

READ MARCH 28th, 1843.

CASE I.

M—— P——, a young female, æt. 26, of apparently healthy constitution, was the subject of a tumour of an enormous growth, evidently connected with the thigh bone. The tumour was not of an osseous hardness, but appeared to the touch to be composed partly of solid, partly of fluid substance. It extended from the knee joint to within an inch of the trochanters, and measured, in its greatest circumference, 35½ inches. Its principal projection was inwards; its growth outwards appeared to have been restrained, in some degree, by the fascia lata; the tumour might be felt, however, to extend all around the femur. On the posterior aspect of the limb the increase upwards was not so great: the hand might be placed between

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the tuberosity of the ischium and the tumour. The integument covering the tumour was free from discoloration, and appeared in other respects healthy. A few enlarged veins were apparent on the surface. Progression was but little impeded, except by the weight and bulk of the limb; the leg and foot had been free from œdema, until a short period previous to the operation. The patella might be felt moveable at the lower part of the tumour, a little to the outside of the median line, and the knee might still be partly flexed. The patient had suffered but little pain or inconvenience at any period during the growth of the tumour. The first intimation of this formidable disease (which could not be traced to any injury) occurred in the summer of 1829, when the patient was attacked (while taking a long walk) with rather severe pain over the inner condyle of the femur. This, however, readily gave way to rest and remedies, but returned upon any unusual exertion. It was not however till May of the following year that any swelling was perceptible, and in June she came to town to consult Mr. Lawrence. At this period a tumefaction was perceptible just above the inner condyle, projecting but little, and of the size of the half-closed hand. Mr. Lawrence gave no hopes of relief from remedies.

I did not see the patient till about the middle of February 1833. She had been previously under the care of Messrs. Tothill and Huntly, who tried various remedies, both local and constitutional: the tumour, however, had progressively increased, and

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at the time of my first visit had attained about half its ultimate size, occupying the lower half of the thigh. I recommended the immediate removal of the limb, explaining fully the increase of danger from further extension of the disease upwards. It was not, however, till the following year, that the patient could make up her mind to submit to an operation of so formidable a nature.

In the latter part of February 1834, the rapid increase of the tumour upwards, accompanied by œdema of the leg, and other symptoms of imperfect circulation, rendered it necessary to explain to the patient that no further delay could be admitted if any endeavour to save her life was to be made.

The patient at length consented, and on Saturday, March the 1st, I performed the operation in the presence of Messrs. Walker, Lane, Huntly, Emmott, Patten, and Ridout. The extent to which the disease had increased towards Poupart's ligament, gave rise to the important question whether sufficient sound bone remained to allow of the removal of the limb below the trochanters, or whether it would be necessary to disarticulate at the hip joint.

It was determined, however, to make the incision so as to provide for all emergencies.

The external iliac artery being compressed above Poupart's ligament by Mr. Lane, a long narrow-bladed knife was passed through the limb from before backwards, entering about two inches below Poupart's ligament, and about an inch to the outside

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of the femoral vessels. The instrument having touched the bone, was passed on its inside, and made to pierce the limb directly opposite to the point of entrance; the inner flap was then cut, by dividing the soft parts obliquely downwards, and towards the surface. The bone was now fortunately found healthy for at least an inch below the trochanters, and the after steps of the operation were conducted accordingly. The knife was again brought to the upper part of the wound, and passed a second time from before backwards, between the remaining soft parts and the bone, and thus an outer flap was formed, by cutting obliquely downwards and outwards. In doing this, some little difficulty was experienced, from the force required to cut through so large a mass of flesh with one stroke of the knife, which, indeed, scarcely appeared strong enough for the purpose; the bone was now more completely exposed, by a scalpel applied to the muscles immediately connected with it, and was sawn through just below the trochanter minor. There was scarcely any arterial hæmorrhage. What little occurred, was immediately arrested by one of the gentlemen present grasping the flap, so as to compress the bleeding vessels, until as many as ten ligatures were applied.

The patient, who bore the operation extremely well, now became faint; two or three terrific gasps followed, and she appeared to all present *in articulo mortis*. She was carried immediately to bed, when, to the great satisfaction and relief of all present, she

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began to revive. The dressing of the wound was proceeded with; the flaps adapted well to each other, and were held together by four sutures and adhesive straps. A bandage could not be well adjusted, and was therefore dispensed with.

The daily symptoms of the case, as they occurred, were of extreme interest to those in attendance, but it will only be necessary here to state, that the patient went on progressively improving, until about the 28th of May, when she ceased to require any further attendance, being perfectly well.

It may be as well, however, to mention, that secondary hæmorrhage occurred about five hours after the operation, which required the wound to be opened. On dressing again, sutures were not used, and there was scarcely any union by the first intention. The ligatures were rather longer than usual in separating: that placed on the main artery did not come away before the fifth week. An erratic, indistinct kind of erysipelas appeared on the second week, occupying the opposite limb, and lingering for about a fortnight. One or two attacks, also, of vomiting and diarrhœa occurred, creating much anxiety; they, however, gave way readily to appropriate remedies. An opiate was required every night for the first six weeks, and was then gradually dispensed with. Colocynth, rhubarb, and blue pill, were given almost daily, to ensure proper alvine secretions; and bark was had recourse to after the second week on the appearance of the erysipelas.

A cast of the limb was taken after removal, and

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afterwards a longitudinal incision made through the centre of the tumour, thigh bone and patella. The muscles could be all distinguished, the fibres of the crureus were in immediate contact with the diseased structure, the arteries and nerves all appeared healthy though much displaced, particularly in the popliteal space. The outline of the bone was exceedingly distinct, passing through the centre of the tumour, and even the medullary cavity appeared but little altered. The bulk of the tumour was made up of numerous cartilaginous cysts, many of which communicated with each other, so as to form a large central cavity, in which was contained several pints of a tenacious, yellow, honey-like fluid. The wall of the cysts being about a quarter of an inch in thickness, was composed of a whitish elastic tissue resembling cartilage, but rather more transparent: there was very little deposit of osseous tissue, and the morbid growth appeared more connected with the periosteum, than with the bone itself. For the space of two or three inches the medullary canal was filled with a similar transparent structure. Nothing resembling the different species of malignant growth could be detected in any part of the tumour. The knee joint was perfectly healthy as to the different structures entering into its composition, being altered only in form. An engraving of a section of the tumour in its recent state, and a cast of the limb after removal, will be seen in Plate III.

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CASE II.

E——— G———, a married lady, æt. 37, the mother of seven children, of a spare habit, and of apparently healthy constitution, states that eleven years back she first observed a small projection, about the size of half a walnut, situated on the inside of her knee, unaccompanied by any pain or tenderness, and which increased but little in size for the first five or six years. At this period I first saw the patient, and found a tumour not larger than half a bantam's egg, connected with the inner condyle of the femur, occasioning no pain or inconvenience. I recommended nothing to be done for it unless it increased in growth, or became painful.

At the expiration of another five years, viz. in March 1841, the tumour had considerably increased in size, still unattended by much inconvenience. It measured, at this time, 16¼ inches in circumference, the measurement of the limb below the knee not exceeding 12 inches. The tumour had extended especially upwards; it was most prominent inwards and towards the ham, less so towards the outside of the knee.

At this stage of the growth of the tumour, Mr. Lawrence was consulted, April 1st, 1841, who gave no hope of relief except in amputation of the limb. A few days after this, I was applied to again by the patient, and without knowing that Mr. Lawrence had seen the case, gave the same opinion as to the

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necessity of the removal of the limb; but the patient being at this time in the fourth month of pregnancy, I advised the postponement of the operation till after her confinement. This took place September 19, 1841.

During, and after her pregnancy, the tumour was occasionally painful for a week or a fortnight together, but the pain readily subsided under rest and the application of cold lotions. For six months previous to the performance of the operation, and particularly after weaning her child, the tumour grew more rapidly, and she suffered more pain and inconvenience from it than at any former period.

In April 1842, Dr. Chambers's opinion was taken as to the state of the patient's general health, when he informed her that no disease existed that ought to prevent the performance of the operation. Accordingly, having recruited her health by a residence in the country for a few weeks, and after some little further delay, the operation was performed August 10, 1842, in the presence of Mr. Lane, Mr. Patten, Mr. Ridout, and Mr. Sannemann, who kindly rendered me their assistance.

The circular operation was performed; the stump healed by the first intention; the ligatures came away in about three weeks, and in a month she was perfectly well, and has remained so to the present time.

The circumference of the tumour was found to measure 20½ inches, while that of the limb below does not exceed 12 inches. A longitudinal section

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through the centre of the thigh bone and the tumour, showed a complete identity of structure in this and the tumour of the former case, as well as a remarkable similarity in their position and general outline. The same nodulated appearance on the surface—the same transparent and cartilage-like texture—a similar displacement of the popliteal vessels, are conspicuous in both.

In each, a central cavity existed, but of less relative capacity in the smaller tumour, and the fluid contained in this was not yellow, but colourless, and not more than an ounce or two in quantity. On comparing together casts taken from the two limbs, a great resemblance may be remarked in the form and general appearance of the tumours. In both, the advancement of the growth has been upwards on the thigh, being restrained towards the leg by the insertion of the ham-string muscles—in each the most prominent part of the tumour is inwards, where a longitudinal constriction may be noticed, formed by the sartorius muscle—each presents a remarkable flatness on the outside of the limb, in which situation the tumour has been evidently compressed by the tense and unyielding fascia lata of this part, while in the loose texture of the popliteal space a considerable projection appears. I am happy, in conclusion, to be able to mention the more fortunate coincidence of the recovery of both patients from the operation—their entire freedom from any return of the disease—and their enjoyment at the present moment of perfect health.

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REMARKS

ON

CANCRUM ORIS,

AND

THE GANGRENOUS EROSION OF THE CHEEK OF MR. DEASE AND DR. UNDERWOOD,

AND MORE PARTICULARLY ON

THE EFFICACY OF THE CHLORATE OF POTASH, IN THE TREATMENT OF THOSE DISEASES.

By HENRY HUNT, M.D.

READ MARCH 28TH, 1843.

Cancrum Oris has been described as a disease, as mild in character as the phagedæna of the cheek is severe. When, however, the former has been neglected, it frequently becomes so similar to the latter, both in appearance and in the extent of its ravages, that they have appeared to me to be one and the same disease, only differing in the degree of severity, but depending on the same morbid condition of the body. To prevent my being misunderstood as to the disease over which I have found this remedy to possess such power, I will briefly describe it.

It commences by small ulcers, either on the inside of the cheek, or at the point of junction of the mucous membrane of the cheek and gums, or in

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the gums themselves, separating them from the teeth: they are very tender and painful, and attended with profuse salivation; the breath soon becomes tainted with an offensive smell, not unlike the mercurial fœtor: if the disease is neglected, the ulceration goes on to destroy the gums, the teeth loosen and fall out, the alveoli are laid bare; at the same time the brown ragged ulcer spreads rapidly on the inside of the cheek, the integuments over the spot corresponding to the ulcer become hard, swollen, at first white and afterwards of a dull red colour, and shortly a black spot appears in the centre, which quickly spreads and destroys more or less of the cheek; and if the child survive, it is sadly disfigured, and not unfrequently loses the power of opening its mouth, from the unyielding nature of the cicatrix; but more commonly, if the disease has extended its ravages to this extent, it sinks and dies.

In all cases that have fallen under my observation, it has been quite clear that the mortification of the integuments has succeeded to the ulceration of the internal parts; for when my attention has been called to the hard, swollen, and painful state of the cheek, as if that were the only disease, I have invariably found, on examination, the brown ragged ulcer on the inside;—the contrary, however, appears to be the case in the account given of it by Mr. James, in his work on inflammation, for he writes, "that the ulceration of the gums succeeds the swelling and hardness of the cheek," and Dr. Mar-

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shall Hall's description, in the Edinburgh Medical and Surgical Journal, agrees with that of Mr. James; for he states, "that children are liable to a particular affection of the face, which *begins* with pain, hardness, swelling, and slight erythematous redness, and terminates in the formation of a spreading eschar and ulcer." Whatever difference there may be in the commencement of these diseases, in their advanced and aggravated state they become so similar that it would be difficult, if not impossible, to determine in which of the two ways each individual case had begun. It has been remarked, that these diseases most often occur in winter, and this coincides with what I have seen of them, but I have noticed that they are more frequent at the commencement of the cold weather, particularly when it is both wet and cold: although this may be the general rule, it is not uncommon to meet with cases at all seasons, and the fatal one which will be detailed, occurred in August, during very fine weather.

It has been remarked to me by an old and very experienced physician who first directed my attention particularly to Cancrum Oris, that he had known it occasionally attack several children in the same family almost simultaneously; and once or twice during a practice of forty years, cases of it were so prevalent in the town in which he practised, that it appeared something like an epidemic; this, however, never occurred during the sixteen years that I lived and practised there.

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The general appearance of the children afflicted with these diseases was extremely unhealthy, they were pale and cold, their flesh flabby and soft, and the secretions very offensive and unnatural. Before giving the chlorate of potash, when it has been possible to induce the child to swallow an aperient, I have given in the first place a dose of rhubarb and sulphate of potash with a grain of calomel; but generally the pain and tenderness of the mouth has been so great that it has not been feasible. I have therefore given the chlorate at once, and have waited a day or two, until the mouth has become less tender, and then have ordered the aperient.

The quantity of the salt that I have been in the habit of prescribing varies from twenty to sixty grains, according to the age of the child, in divided doses in twenty-four hours, dissolved in water; the beneficial effect is often observed on the following day, almost always on the second; the disagreeable fœtor soon lessens, the sores put on a healthy reparative action, the dribbling of saliva diminishes, and if there is mere ulceration it very speedily heals, if there is an eschar, it soon separates, and the sore granulates kindly. In no other disease did I ever see the beneficial effects of any medicine so soon manifested, as that of the chlorate of potash in these diseases. It is sometimes advisable, indeed necessary, that the aperient should be occasionally repeated.

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CASE I.

—— Hutchins, ætat. 3½, was brought to me, having a sore mouth, he was pale and haggard, flesh soft and flabby, the surface of the body was cold, pulse quick and weak, and he appeared to suffer much in his mouth, the saliva continually dribbled away, and the breath very offensive, so like the mercurial odour that I attributed the state of his mouth to the effect of calomel. With some difficulty I was enabled to examine his mouth, the gums were in a state of ulceration, particularly on the right side, and there was a brown ragged ulcer in the inside of the cheek; on the outside, corresponding to it, there existed a hard painful swelling, with a slight blush of inflammation on it, the tongue as well as I could see it was sodden, and swelled, and indented at its edges by the teeth;—the belly was large, and the alvine evacuations very offensive, and the food passed but little digested; the child had been pale and ailing for some time, but the state of the mouth had only been observed three or four days, and was getting rapidly worse. I prescribed the following mixture: ℞. Potassæ chloratis ʒfs syr. simplicis ʒj aquæ ʒxi misce.:—a tea spoonful to be taken every hour, or oftener if possible. On the following day the smell of the breath was much less disagreeable, the salivation considerably lessened. On the succeeding day the ulceration of the gums was evidently checked, and the tenderness had much diminished,

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so that an examination was made with much less difficulty; the ulcer on the cheek had begun to put on a more healthy action, and the external swelling was lessened. The same remedy was continued, and a grain of calomel, with eight of rhubarb and twelve of sulphate of potash, was ordered for the morning: this cleared out the bowels of offensive stools, and the child appeared in every respect better, the brown ragged appearance of the ulcers had given place to a more healthy surface, which was rapidly healing. The plan was pursued for a week longer, by which time the child was perfectly sound. This rapid progress has been made, without exception, in every case in which I have given this medicine, when there has been no eschar. In those cases where there has been one, more time has been required to throw off the slough, but all have shown almost immediately the power of this medicine in arresting the disease.

CASE II.

William ———, ætat. 3, the son of a turnpike keeper, who lived on the top of a hill in the purest air, was brought to me October 5th; he was pale and sickly, and had been out of health for some weeks; he had refused his food for several days, from great soreness in his mouth; the cheek on one side was occupied by an ill-conditioned ulcer, extending to the gums, they were spongy and separated

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from the teeth; the cheek was swelled, hard and painful, of its natural colour; the child's belly was full and tense, and the evacuations very unhealthy.

I ordered a mixture containing potassæ chloratis ℈ij syr. simplicis ʒij aquæ ʒiiſs,—of which he was to take a dessert spoonful occasionally, so that the whole was taken in twenty-four hours. When I saw him two days after, the 7th, the ulceration was arrested and healing. An aperient of calomel, rhubarb, and sulphate of potash, was ordered for him, and to continue the chlorate; at the end of the week his cheek was perfectly healed.

With the exception of the following case all have terminated favourably; and in this, the child lived sufficiently long to show the beneficial influence of the remedy.

CASE III.

In August 1836, I was requested to see a child, a girl between 5 and 6 years old, who had been under the care of another practitioner. I found almost the whole cheek of the right side in a state of mortification, quite black, which was rapidly increasing, with a margin of dusky-red inflammation without the slightest trace of separation; some teeth had fallen out, and others were loose, the gums having been eaten away by the phagedænic ulcera-

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tion; almost the whole inner part of the cheek was one large foul ulcer, the stench was most fœtid—the pulse was rapid and fluttering, and the extremities cold. The attention of the mother had been attracted to the state of the mouth a week before, by the child's complaining of the soreness of it, and by its refusing all kinds of food excepting liquids, and by the salivation. Medical assistance had been called in, but the ulceration continued its ravages, and a black spot had been observed first, four days before I saw it, in the centre of the part which had been previously swelled. Without hope of benefit I ordered the following mixture: ℞. Potassæ chloratis ʒij syr. simp. ʒij aquæ ʒiſs misce.—two tea spoonfulls to be taken every hour; and that as much of the salt should be taken as possible, I ordered two more scruples to be dissolved in a wine-glass of port wine with as much water, the whole of which was to be given during the next twelve hours, or sooner if possible: at the expiration of that time, I fancied there was less disagreeable smell, and the child appeared to have rallied a little; I therefore ordered the chlorate to be continued in the same quantities: on the following day the smell had certainly diminished, and there was a slight crack between the dead and living parts; this separation increased so much during the next twenty-four hours, that it showed the disease was arrested. On the following day, the edges of the eschar began to separate, and the internal ulceration had put on a more healthy appearance, but during the following night

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the child sank and died. I certainly then thought, that had the medicine been given before the disease had proceeded so far, it would have saved the child, although at the expense of a portion of the cheek. The only external application was a poultice, wetted with a weak solution of the chloride of lime.

That the fœtid smell from these sores should be removed quickly by this salt is not surprising, as doubtless in the struggles with the child to oblige it to swallow, the sores were frequently brought in contact with the medicine, when of course it acted as a topical application, and destroyed the smell, as the chlorates are known to do when applied to external sores; but that there should be so speedy an improvement in every particular feature of the case has always struck me with astonishment, and not until many successive cases occurred to me, did I give a full credence to the power of it; but the experience of nearly twenty years, during which time I have again and again administered it, and I may say with almost invariably good result, if given before the child has been much exhausted,—leave me no room to doubt its peculiar value in these and some other analogous diseases. I am also borne out in this opinion by the experience of two or three medical friends, who were induced to try it on my suggestion. At some future day I may, perhaps, be allowed to lay before the Society my experience of this remedy in the other diseases to which I have alluded—when I hope to be better prepared to offer

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some explanation as to the manner in which it operates so quickly and beneficially.

Since this paper was read, the following case occurred in St. George's Hospital, under the care of Mr. Cæsar Hawkins,—to whom I am indebted for it.

Selina Gingham, seven years of age, was admitted into St. George's Hospital May 12th, having suffered from ulceration in the mouth, for at least seven weeks, during five of which she had been under treatment at a dispensary, which had not prevented the disease from slowly spreading; it is probable that the ulcers had existed for some time before they were discovered, as her breath had been observed to be very offensive; she had had measles a year before, but appeared to be in very fair health, and had not suffered from any privations.

The external surface of the right cheek appeared somewhat swelled and stiff, when she tried to act with the muscles of that side, but was not inflamed: on the inside the whole mucous surface of the cheek and lips, opposite to the gums of both jaws, was ulcerated and covered by a thin ash-coloured slough, the ulcer extending from the central incisors to the last molares. The gums of both jaws were soft and spongy, and dark coloured and swollen, and a little loosened from the teeth, and bled slightly when touched, and the teeth themselves were encrusted

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with offensive sordes and detached lymph and slough: —the edge of the tongue, where it came in contact with the teeth and gums, was in the same state of superficial ulceration as the cheek. The secretion was very offensive, but the ulcers were not painful.

13th. Having been admitted after my visit yesterday, I did not see her till to-day, and the ulcers had spread slightly since the previous day. The mouth was ordered to be washed with a gargle, containing one-twentieth of solution of chloride of lime; a powder consisting of three grains of hydrarg. cum creta and ten of rhubarb was given to her, and she was directed to take a scruple of chlorate of potash thrice daily in pimento water.

15th. The ulcer along the cheek was healed, except a narrow line between the teeth, and the tongue was quite healed, and the gums were much improved in appearance.

17th. Only a small ulcer remains opposite to the last molar tooth.

19th. The gums were again inclined to bleed, and were a little swollen, and the tongue was much loaded; a small vesicle had formed again on the lip. The aperient powder was repeated, and the dose of chlorate increased to half a drachm.

22nd. Sore perfectly healed, and the appearance of the gums nearly natural.

The chlorate was continued two or three days more, and the girl left the hospital on the 31st; and I heard a few days ago that she continued well.

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The ulceration in this case was in a form that I have often cured by ordinary means, and it never had any tendency to rapid sloughing; my impression is, however, that the very marked improvement effected in two days was greater than I had ever before seen from other plans of treatment, and I am induced to anticipate much from this medicine, in more urgent cases of this serious and troublesome complaint.

I am, &c.

CÆSAR HAWKINS.

Grosvenor Street, June 21, 1843.

P.S.—The child came to my house on the 5th of July, having a slight return of her complaint, in a small part of the surface previously affected; for this I prescribed the chlorate of potash again, and when she showed herself on the 13th, it was quite healed.

C. H.

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CASE

OF

ULCERATION OF THE PULMONARY ARTERY

INTO AN ABSCESS OF THE LUNGS.

WITH REMARKS BY JOHN DALRYMPLE, Esq.

By WILLIAM CROWFOOT, Jun., Esq., Beccles.

Communicated by JOHN DALRYMPLE, Esq.,

surgeon to the london ophthalmic hospital.

READ APRIL 11th, 1843.

Mr. L. B., aged 36, of short stature, strumous diathesis, and the member of a large family, several of whom have died of pulmonary consumption, had from childhood suffered from difficult breathing, the consequence of repeated attacks of inflammation of the respiratory organs, to which he had always been peculiarly subject. In the autumn and winter of 1841 he suffered from cough with muco-purulent expectoration, frequently tinged with blood,

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and almost all the symptoms of phthisis; by rest, steadily-continued treatment, and a careful avoidance of exposure to cold, his more urgent symptoms were relieved; and, being naturally energetic, he returned to his usual professional avocations, those of a medical man, in the spring and summer of 1842; but he still continued to cough frequently, and expectorated every morning a considerable quantity of muco-purulent matter, occasionally tinged with blood; in this state he continued till the end of November 1842; when, after some considerable excitement, he was attacked with active hæmorrhage, which recurred almost daily, and sometimes in very considerable quantities, varying from half a pound to two pounds. The blood was always expectorated without effort, and appeared almost to flow of itself into the mouth, producing a slight tickling sensation in the trachea, for the relief of which he made a little cough, which was always followed by the expectoration of more or less blood mixed with a little mucus. The physical signs presented by the chest at this period were as follows:—the ribs on the left side were contracted and flattened when compared with those of the right side; the upper part of the left side of the chest was dull upon percussion, and the respiratory murmur was absent in that situation; the right side presented no abnormal sound. The pulse varied from 60 to 80 pulsations in the minute; the urine not high coloured; the tongue slightly coated, with a shining

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unhealthy appearance in the mucous membrane of the pharynx. I need hardly say that residing in the house of a most intelligent medical friend, no remedial means were left untried which either professional ability or the kindest friendship could suggest, but all proved unavailing; increased faintness supervened upon the increasing attacks of hæmorrhage, and at the end of a month he sunk from the exhaustion consequent upon the repeated bleedings.

Post mortem examination of the chest twenty-four hours after death.—Externally the left side presented the same flattened appearance observed during life. Upon opening the cavity of the thorax, numerous adhesions were found between the pleura pulmonalis and costalis of the left side, and the pleura investing both lungs had that peculiar spotted appearance arising from the deposit of strumous matter which is constantly observed in scrofulous subjects. The upper part of the left lung was entirely occupied by a large cavity containing about half a pound of grumous and coagulated blood; the walls of the cavity were composed of the parenchymatous structure of the lungs, condensed and solidified by pressure. Upon careful examination we found the pulmonary artery opening into the cavity at the distance of two inches from its bifurcation by an aperture as large as a crowquill. The right lung was healthy, with the exception of the strumous spots already alluded to.

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Some few points of interest not having been noted in the foregoing letter, Mr. Crowfoot subsequently added, "that the communications between the cyst and the bronchial tubes were numerous but not large. There was no disease or ulceration of the mucous lining of the trachea, which we, in common with all his medical friends, had been led to expect, owing to his constantly referring his pain and uneasy sensations to that organ."

Mr. Beales, of Halesworth in Suffolk, the kind and intelligent medical friend with whom L. B. resided, subjoined the following particulars:—

"The pulmonary artery was so large, as at first to be taken for the aorta, for it had a complete curvature to the right, as high up, and upon a line with the clavicle of the left side. The opening into the abscess, it is probable, was the result of the coats of the artery giving way, rather than the effect of the ulceration of the abscess; as the opening from the artery was funnel-shaped, and terminated in the smallest possible aperture."

This case is submitted to the consideration of the Medico-Chirurgical Society, as one abundantly interesting in its details, and as affording an unequivocal instance of the communication of a large artery with the cavity of an abscess. The dilatation of the pulmonary artery may perhaps be attributable to pressure of the cyst upon one of its main divisions, and whether the communication between it and the abscess be due to the ulceration of its coats from pressure, or from bursting of its dilated and thin

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parietes, is a matter of far less moment than the establishment of the fact, that no vessel in the body is exempt from the consequences of pressure, and of the disintegrating influence of suppurating cavities in their immediate neighbourhood.

Abundant examples of the ulcerations of arteries of the systemic system have now been published, and Mr. Bloxam's paper shows that the large veins may be similarly circumstanced. This interesting case of Mr. Crowfoot completes the deficiency in the chain, by exhibiting a fatal hæmorrhage from the communication of a large branch of the *pulmonary* artery with a chronic abscess of the lungs.

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CASES

OF

STRANGULATED HERNIA,

REDUCED "*EN MASSE.*"

WITH OBSERVATIONS.

By JAMES LUKE, Esq.,

SURGEON TO THE LONDON AND ST. LUKE'S HOSPITALS, AND LECTURER ON SURGERY.

Communicated by Sir B. C. BRODIE, Bart.

READ APRIL 25th, 1843.

Amongst the numerous and ever-varying occurrences in the progress of cases of hernia affected by strangulation, there is occasionally to be met with, one so little expected by the generality of surgeons, yet of so dangerous a character, if not detected and met in a proper manner at an early period, that I hope, by directing the attention of the Society to it by the relation of cases, followed by some observations, intended to be of a practical nature, I shall not be considered to have entered upon an unnecessary or superfluous undertaking.

The occurrence to which I allude, takes place during the application of the taxis, mostly, when

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used by patients themselves for their own relief, but is also liable to take place in the hands of the surgeon, when too much force is applied under certain contingencies favourable for its production.

It consists in the reduction of the hernial tumour through the aperture of the abdominal parietes, together with its investing sac, whereby the hernial contents continue still subject to strangulation, in the same degree and by the same cause that existed previously to the reduction, and demand, no less imperatively, liberation from constriction by an operation, than when presenting the more obvious guide of external tumour. French surgeons have called this kind of reduction "*réduction en masse*," or "*réduction en bloc.*" But British surgeons appear to have considered the occurrence to be of such rarity, as hardly to have any influence upon the general course of practice. We, therefore, find the surgical records of our own country almost wholly barren of cases of this description, and our best and most approved writers upon the subject of hernia are altogether silent, or refer to examples taken from the records of other countries, where the occurrence of "*réduction en masse*" has excited greater attention.

Although, from these circumstances, we must admit that the reduction alluded to is an event of some rarity, yet I am induced to think, that it is one of less rarity than is generally supposed, and that at least it is so frequent, that it should be held constantly in view as an occurrence within the

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range of ordinary probabilities, and as requiring only favouring circumstances for its development.

I am led to the above conclusion, by the occurrence of five cases of reduction *en masse* under my own notice; a conclusion the more desirable to be adopted, as an error of omission during the actual existence of such reduction will prevent the use of the only means likely to be available to the safety of the patient.

One of the above cases occurred in a patient about fifty years of age, who had been admitted into the London Hospital for an ulcer of his leg. He had been the subject of inguinal hernia on the right side, for many years—which, under the influence of some exertion, descended, and became strangulated, after his admission. The attention of the house-dressers being called to him, the hernia was quickly reduced, and the symptoms of obstruction ceased. After the lapse of a fortnight, the hernia again descended, and became strangulated. Upon this occasion it was reduced by himself; but the symptoms of obstruction continued, and increased in severity up to the period of his death, which took place some days afterwards, immediately subsequent to an effort made to force an evacuation from the bowels. Two other cases came under my examination only *post mortem*.

A great similarity of circumstances appears to have attended the whole of these cases. Thus, in each case the hernia was oblique inguinal—and reduced by the patient's own efforts. In each the

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precise nature of the case was not known during life, and no operative attempt was made to afford relief; and in each the *post mortem* examination discovered a hernial tumour in the neighbourhood of the internal ring, reduced through the abdominal parietes, but lying exteriorly to their general peritoneal investment. On opening the tumour, in each its fundus lay below the level of the ring, towards the cavity of the pelvis, the contents being found in a state of sphacelus, and strictured by the neck of the sac, in which they were enclosed.

The first case, which fell under my own treatment, occurred on a short, muscular stage-coachman, thirty years of age, who, while driving along one of the public thoroughfares of London, experienced the descent of a hernia through the left inguinal ring, but at the time not attended by any pain. He immediately applied pressure to the tumour, without descending from his seat, under which pressure it quickly disappeared.

He thought nothing more of the occurrence until his return home an hour afterwards, when he began to feel pain in the bowels, followed by sickness. Having obtained medical assistance, various remedies were used without relief to his symptoms. On the contrary, the severity of his sufferings became gradually augmented, until his admission into the London Hospital, in the night of August 30, 1839, upwards of three days from the commencement of his illness.

He was at this time suffering from severe pain in

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the abdomen, and great prostration of strength. The abdomen was tympanitic and tense, attended by frequent vomiting of fæcaloid matter, and obstinate costiveness, which latter had not yielded to purgatives administered in the course of the previous treatment. The pulse was weak, and the countenance pale and anxious.

He stated, on being interrogated, that he had been the subject of a large rupture, on the left side, for many years, during the greater part of which he had worn a truss for its support. He also related the particulars of the descent and reduction already mentioned.

It was suspected by the gentlemen formerly in attendance, and by myself, that the hernia had been reduced with its contents still suffering from continued strangulation, and diligent examination of the inguinal rings and canal was made, with the hope of detecting some indication of a local character to guide our proceedings, but none was discovered. The inguinal rings of both sides were entirely free from every appearance of tumour, and the canal was devoid of all external evidence indicative of a hernial descent. Neither was there any fullness of the abdomen in the neighbourhood of the ring, nor more pain caused by pressure in that situation on the left side than on the right.

Amidst the doubts and uncertainties of the case, I determined to await the result of a consultation which I directed to be called for the next day, and in the interim prescribed some medicine, but which,

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when taken, was quickly rejected by vomiting, without producing any beneficial effect.

August 31st. In the absence of clearer indications, it was considered, at the consultation, most prudent to abstain from any operative proceeding.

Subsequently to this decision, the treatment consisted of the occasional administration of calomel combined with opium. Being unwilling to leave the patient without an effort to save his life, I continued about the hospital, and visited him from time to time, devoting much anxious consideration to his case. After the lapse of about three hours I arrived at the determination to perform an exploring operation, especially as, during my consideration, it had occurred to me that such an operation might be performed without entailing any material new danger, until a hernial tumour should be made manifest to me, and be opened for the liberation of its contents by the course ordinarily adopted for that purpose.

This determination, on proposing the operation to the patient, was not acted upon, in consequence of the emphatic assurance which he gave, that at the time of his reducing the hernia he had employed but very little force, and that the reduction was not attended by the slightest pain; the reverse of two contingencies that might generally be supposed to precede or accompany the reduction of a strangulated hernia, together with its investing sac.

Being, in the evening, under the necessity of

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leaving London for a few days, the patient was left in charge of the assistant-surgeon, by whose directions the treatment was conducted during my absence.

On my return to town, September 4th, I found my patient still alive, but with all his symptoms of danger much increased. A local indication had also now arisen, by the formation of a tumefaction along the course of the inguinal canal, which induced me instantly to propose and perform as quickly as possible, the operation of exploration which I had before contemplated.

An incision was made over the seat of tumefaction, from which a quantity of highly offensive sanious fluid exuded, and by the infiltration of which into the cellular texture of the part, the tumefaction had been caused.

Continuing the incision towards the internal ring, a lustreless greenish membrane presented itself, the tense and rounded surface of which extended beyond the limits of the opening made by the operation. This was at once recognised to be hernial sac, and therefore opened.

On examining its contents, they were found to consist of a large quantity of intestine, sphacelated and reduced to a pulpy condition, so that it gave way under the pressure of the finger, introduced for the purpose of ascertaining the seat of stricture. This latter was reached by the finger with great difficulty, in consequence of its distance from the opening of the parietes. Being reached, the finger

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was passed through it, and when withdrawn was followed by fæculent discharges, rendering further division unnecessary. A free vent for the discharges was made by enlarging the external wound, and the patient taken to bed. A bread-and-water poultice was applied over the part, and stimulants were administered by the mouth.

Copious discharges continued to flow from the wound for two days, at the end of which he died, his death taking place on September 6th.

The large hernial sac discovered during the operation, was brought more fully into view at the examination *post mortem*. It was found to occupy a considerable space just within the abdominal parietes in the vicinity of the internal ring. The fundus of the sac lay a little below its level, towards the cavity of the pelvis, while the neck (still contracted, so as obviously to have been the original seat of stricture) lay in an upward direction towards the umbilicus, and between three and four inches distant from the situation of the internal ring. The whole sphacelated contents were empty, collapsed, and in a pulpy state.

The second case occurred in a respectable baker aged 40, also a rather muscular man. He had been the subject of a large inguinal hernia on the right side for upwards of twenty years, and of a small hernia on the left side for about four years. About seven o'clock in the evening of January 6th, 1843, while removing some bread from the oven, he was suddenly seized by a severe pain, extending

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from the neighbourhood of the left inguinal ring across the abdomen. Upon examination of the part he found that a tumour had taken place under the pad of his truss. The pain was shortly followed by nausea and vomiting. To the tumour he applied warm fomentations, and after a time made attempts to reduce it within the abdomen; in these he thought he had succeeded, for the tumour disappeared. The vomiting, however, continued through the night and next day, and he was induced to take a dose of Epsom salts. Not deriving the relief which he expected, the aid of the family medical attendant was called in. The patient, thinking that his illness was a common "bilious" attack, omitted to mention any thing respecting the existence of hernia. The character of the symptoms, however, led his attendant most judiciously to make inquiries upon that head, when the fact of the presence of hernia became known. On instituting a local examination he was led to the suspicion that continued strangulation was the cause of the symptoms remaining unmitigated.

At this period my attendance in consultation was requested.—Jan. 7, 9 p.m.—I found the patient lying tranquilly and listlessly in bed, with the countenance betraying little sign of anxiety, and the pulse apparently not disturbed. The tongue was dry in the centre, and the abdomen slightly tumid, and indicating very little pain on pressure. I was, however, informed that everything taken by the mouth since the preceding night had been rejected

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by vomiting, and that the bowels had not been opened.

On proceeding to examine the groins, I found that the hernia of the right side descended into the scrotum, which it filled to a considerable extent: it was not painful, and was very easily reduced into the abdomen. On the left side there was not any tumour perceptible to the sight, yet on making pressure with the hand, a tumour was obscurely felt in the situation of the internal inguinal ring, somewhat rounded on its surface; but not well defined. When pressed on, it receded more deeply within the abdomen, and was slightly painful. We at once concluded that a strangulated hernia had been reduced *en masse*, and that the continuance of symptoms of obstruction were referrible to that circumstance. Under this impression I placed the patient in the erect position, and requested him to cough and strain, hoping that by the effort, the descent of the hernia might be reproduced.

Having failed in this endeavour, I suggested an operation of exploration as the only probable means of obtaining any satisfactory information, proposing to liberate the hernial contents from strangulation, provided the suspicions entertained should prove to be well grounded.

Unwilling to precipitate an operation in so uncertain a case, we thought it justifiable to delay a few hours, with a view to try the effect of medicine, which the short duration of our attendance had not hitherto afforded an opportunity of doing. We

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arranged to meet at nine o'clock the next morning, and to proceed then to perform an operation if circumstances should demand it. In the interim we directed gr. ij. of calomel combined with gr. ¼ opium, to be taken every two hours, and for the intermediate hours we prescribed ʒij of Epsom salts dissolved in peppermint water.

Jan. 8, 9 a.m.—The patient this morning stated that he was better. He had retained all the medicines which had been administered during the night, and had not any vomiting or any pain in the abdomen. The tumour, before obscurely felt at the internal ring, had entirely disappeared, nor was there any fullness remaining in the part which it occupied. There was, however, a slight pain on pressure with the hand, but stated to be much less than when last examined. He had slept at intervals through the night, and had taken tea, &c. at times. The pulse was good and the tongue less dry.

These favourable symptoms led me to suspect that my conclusions of the previous night had been erroneous. The absence of evacuations from the bowels still indicated danger; we, therefore, agreed to meet in the evening, directing a continuance of the Epsom salts and peppermint water, and an omission of the calomel and opium.

At 3 o'clock I was again summoned to attend. The vomiting had returned, and on my arrival I was informed that it had recommenced about 12 o'clock, and that nothing had been retained on the stomach since that time. The countenance was

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anxious and pale, and the tongue very dry. The pulse was weak and intermittent, the abdomen tumid and painful, and the fluid ejected by the mouth was of a fæcaloid character. At this time there did not exist the slightest trace of tumour in the situation of the ring.

Upon this return of severe symptoms I proposed the performance of an operation of exploration, which being assented to, was proceeded with immediately.

The patient being placed with his legs over the side of the bed, and his shoulders supported by pillows; an opening between three and four inches in extent was made by transfixing a fold of integuments over the course of the inguinal canal; by which opening the tendon of the external oblique muscle, the external abdominal ring and spermatic chord were brought into view. A finger was then introduced into the ring to feel for some indication of the presence of a tumour within the inguinal canal, but there was not any discovered. The canal was next laid open by a division of the tendon of the external oblique muscle. It was observed that the spermatic chord was clear and unobscured by any superjacent structure, except by a small lobule of fat which overlaid its upper part. While pursuing the examination towards the internal ring, some cellular membrane lying on the inner aspect of the chord appeared more condensed than usual in that situation; which, upon closer investigation, proved to be a condensed capsule containing an empty cavity

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within it, sufficiently large to contain a small egg. It was thought probable that this capsule had formed an investment to the hernial sac, and was now left empty by reason of the reduction that at this time was strongly suspected to have been effected. A finger passed along this cavity entered the internal ring, the large, firm and defined borders of which were distinctly perceptible. By pressing the finger a little more deeply within the abdomen, the rounded and tense surface of a tumour was readily detected, which, after some little more exposure, was seen to be dark-coloured. It was clear that the hernial sac was now reached, and the fact of a reduction *en masse* was made manifest. It was ascertained by an examination of its surface that the seat of stricture was at a considerable depth from the internal ring, and probably upwards of two inches from the abdominal parietes.

The subsequent steps of the operation consisted of freely dividing the margin of the internal ring, by which proceeding the hernial tumour was permitted to be easily drawn out into the inguinal canal, and opened without the danger which would have attended the proceeding, had it been attempted while it lay deeply within the parietes. The sac contained a small quantity of very dark-coloured fluid and about six inches of small intestine of a dusky red colour, with one small black spot on its surface, the whole being strictured by the neck of the sac.

The stricture was clearly seen and easily divided,

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after which the contents were readily reduced within the general cavity of the peritoneum, and the wound closed by two sutures and adhesive plaister.

The extensive division of the abdominal parietes rendered extra precautions necessary against reprotrusion of the intestine, and graduated compresses and bandages were applied over the part. The pulse being weak after the operation, some wine and water were given to the patient, but no medicine was ordered.

At 9 p. m. the pulse had recovered its force, and the pain in the abdomen had diminished. He had taken some bread and milk, to which he was partial, and had not experienced any vomiting, though he had suffered from a little rising in the throat. During the visit the bowels were slightly relieved, and the patient thought he could void more, but was afraid to strain. Calomel gr. ij. with opium gr. ¼ were ordered to be taken at 10 o'clock and repeated at 4 in the morning. An enema was also directed to be administered in a short time, unless the bowels should be plentifully relieved.

January 9th, 8 a. m.—Shortly after our visit last evening the bowels were copiously relieved, and the enema was not administered. After that period there had been ten or twelve evacuations. The pulse was good, the skin free from febrile heat, the pain in the abdomen almost gone, and the patient altogether much improved. He had taken milk and water frequently during the night, without rejection.

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January 13th.—His improvement had been progressive since the 9th. On dressing the wound it was found almost entirely united by adhesion.

January 16th.—The wound was healed and the patient quite well.

The consideration of the foregoing cases is well calculated to afford some useful hints to the practical surgeon, not only for the diagnosis, but also for the treatment of cases suspected to be of a similar nature.

In the first place it may be observed incidentally, that the valuable practice adopted by all prudent practitioners in doubtful cases of intestinal obstruction, of examining the abdominal apertures for the existence of hernial protrusion, may possibly lead to erroneous conclusion unless attended by inquiries into the previous history of each case.

The opinion of the surgeon, in such examinations, is usually influenced by the absence or presence of tumour, and negative or affirmative conclusions are drawn accordingly. However just the affirmative conclusion may be, when derived from the actual presence of tumour, the negative should be admitted with extreme caution, because the contingency of a reduction *en masse* may have occurred, with the hernial contents, still affected by strangulation, yet not affording the evidence of an external tumour. The too exclusive reliance upon the absence of tumour as a sign of the non-existence of a hernia may, therefore, in certain cases be highly dangerous.

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In suspected cases, more security will be derived from the institution of inquiries concerning the *previous existence* of a tumour in the part, and of its conditions when ascertained to have existed, such as its hardness or the reverse, its freedom from pain, and also the amount of, and the manner of applying, the force used for its reduction. By such inquiries, not only may the dependence of the symptoms of intestinal obstruction upon hernial strangulation be determined, but also the presumption of a reduction *en masse* may be raised or removed. Should such a presumption be raised, the surgeon will be then prepared to push his inquiries further, and to seek for indications to direct his diagnosis, which are not usually sought for in ordinary examinations.

The mode of proceeding, to render these indications available to our use, is two-fold. That, however, will in prudence be first adopted, which requires mere manual examination without incision, while the second should be had recourse to, provided the first tends to strengthen the presumption of a reduction *en masse* previously raised. It will be proper to specify, separately, the available indications which appertain to each mode of proceeding.

With regard to the first, by manual examination, a few circumstances should be minutely attended to, which relate to changes in the part, caused by a hernial descent previously ascertained to have taken place—while others may be inquired into as tending to corroborate the conclusions arising therefrom.

Thus it is universally known that a hernial sac,

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when protruded from the abdomen before its contents, quickly acquires adhesions to surrounding parts, and is not usually returnable again through the abdominal parietes. This circumstance is so constant, that some surgeons doubt the practicability of any deviation from the rule during the ordinary manipulations of the taxis; yet it is superfluous to state that such deviations do occasionally occur, when conditions of parts favourable to their occurrence exist.

It is a circumstance worthy of remark, that the firmness of the adhesions of the parts in which it is imbedded bears no proportion to the duration of the hernial protrusion, as might be *à priori* expected; for in all the cases related, the hernia had been of some years' continuance, yet in each was reduced without the employment of much force.

The presence of sac, even without hernial contents, causes an abnormal fullness in the part, easily ascertainable by examination. The absence of such fullness in a part, when hernia is known to have previously descended, necessarily leads to the conclusion, that the sac upon which it depended has been displaced, and probably returned, together with the hernia.

The sac in inguinal hernia, below the external ring, becomes united with the spermatic chord, whereby the latter is usually rendered indistinct and obscure. The absence of that indistinctness and obscurity implies the removal of the cause which previously produced them, and therefore that

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the sac has been displaced. The continuance of the indistinctness and obscurity leads to a directly contrary conclusion.

When a hernia descends from the abdomen, the aperture through which it descends is always enlarged and dilated. This fact is ascertainable by the introduction of a finger, a circumstance which becomes available to the diagnosis in these cases.

Should a large aperture be detected, a previous hernial descent may be inferred.

Under ordinary circumstances of hernia, when the contents are reduced into the abdomen, the area of the aperture is occupied by the remaining sac, while its margins are rendered more or less obscure. If, then, a large aperture be found free and unobstructed, with its margins unobscured, there is raised not only a presumptive evidence of the previous protrusion of a hernia at the part, but also the further evidence of the displacement and probable return into the abdomen of the sac by which the hernia had been invested.

We are led to a contrary conclusion by contrary circumstances.

These, I believe, are the only indications useful to diagnosis, resulting from changes caused by the previous descent of a hernia, at or below the abdominal ring. Nor does the examination of the inguinal canal afford any available information, unless a tumour be discoverable in its course; a circumstance which, by the clearness of the evidence it affords, renders the diagnosis comparatively easy,

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and affirmatively conclusive, but constitutes a description of case not intended to be included in the scope of the present observations, which are directed exclusively to cases unattended by any external appearance of tumour.

Yet, in conducting an examination of the abdomen immediately above the seat of the internal ring, some corroborative evidence of a reduction *en masse* may sometimes be obtained. Thus, it may be expected, that if such reduction has been effected, the inflammation of the hernial contents will cause a circumscribed pain in the seat which it occupies, while a fullness, or even the rounded form of the hernia deeply situated within the abdominal parietes, may possibly be cognizable upon a minute examination; yet the absence both of circumscribed pain, and of fullness or rounded form, should not lead to a negative opinion; for in the first case, neither pain nor fullness existed, yet subsequently a mass of strangulated intestine was discovered at the part.

Their presence, however, may be taken as corroborative of an affirmative opinion, founded upon the manual examination previously instituted.

If circumstances justify a suspicion of a reduction *en masse* in any case, they will also justify attempts to cause reprotrusion of the tumour, that by bringing it into view, the obscurity of the diagnosis may be wholly removed.

With this intention, as advised by surgeons of authority in such matters, the patient should be

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placed in the erect posture, and be requested to cough forcibly, to strain, and to make exertion.

This course of proceeding seems likely to be of use when the hernial tumour is either in the inguinal canal, or at the internal ring; but if it be reduced within the abdomen, as in the cases related, beyond the situation of the ring, the probability of affecting its reprotrusion will be much diminished, and consequently an opinion of the non-existence of a reduction *en masse*, drawn from the non-appearance of a tumour, is to be cautiously avoided.

It is to be regretted, even after subjecting a patient labouring under unequivocal symptoms of intestinal obstruction to the most rigid local manual examination, that the indications afforded for our guidance are so obscurely marked, as too often to render an opinion based upon them extremely uncertain. The existence of this uncertainty may be a sufficient explanation why surgeons, under these circumstances, are usually unwilling to have recourse to ulterior measures of examination, by submitting the patient to the certain pain and possible danger of an exploring operation. Yet such unwillingness may prevent the adoption of the only means of preserving the patient's life.

As the doubts and difficulties of such cases can be removed only by the light which an operation of exploration affords, it is the obvious duty of the surgeon to make that unwillingness yield to the pressing emergencies of the occasion, and not to

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allow personal considerations arising out of the possibility of his performing an unnecessary operation to be placed in opposition thereto. It should be remembered, that an unsuccessful attempt is infinitely to be preferred to no attempt at all; and that passiveness on his part may be more destructive to life than any incisions which he may be required to make.

It cannot be doubted, that, had a section of the peritoneum been necessary in the performance of the exploring operation referred to, the circumstance would have been by some considered as an argument against exploration, because the infliction, by such section, of a certain and known danger, might, with a semblance of justice, be considered as more questionable policy, than continued submission to those dangers, which are uncertain and unknown, and which may possibly be obviated by other means.

With every disposition to give full weight to the dangers of peritoneal section, as opposed to an exploring operation, the whole argument founded upon it may be disposed of by the simple fact, that it is not necessary or even useful, until, by the observance of other indications in the progress of the operation, the actual presence of a strangulated reduced hernia is made manifest to the operator, and when, by the conversion of the unknown condition of the case into the known, the principal arguments against the operation, as involving the

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peritoneum section, have been removed, by its obvious necessity being clearly demonstrated.

In conducting operations of exploration, it therefore becomes very desirable, that great attention should be given to such indications as our incisions make available to our use, so that by the aggregate of these, our diagnosis may, if possible, be made clear, before we arrive at the peritoneal surface.

The indications which are to be sought for, are, for the most part, of a similar nature to those already mentioned, as useful in the manual examination. They are, however, more satisfactory and distinct, inasmuch as the parts to be examined are, by our incisions, brought immediately into view, and are not obscured by the interpositions of superjacent structures. Thus, by the perfect exposure of the external inguinal ring, which the cutaneous incision affords, the size of the aperture, together with the extent to which it is occupied by structures passing through it, are clearly made manifest, and the same inferences drawn from the observance of these particulars, as suggested in the mere manual examination. For if the size of the ring be normal, a hernia has not descended through it; or, if it be larger than the normal state, yet occupied by an empty sac, an evidence of the previous existence of a hernia, together with an evidence of the reduction of the hernia without the sac being also reduced, is established. But should the ring be found large, and free from other structures than the chord, and if the chord be distinct and unobscured by the presence

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of sac, and a void is found where fullness is to be expected from the previous history of the case, a strong presumptive evidence on the contrary side is established, that the hernia, together with its investing sac, is reduced.

In proceeding with the exploration, the inguinal canal is next laid open. It has been observed, that no information of a useful character can be obtained by external examination of this part, unless a tumour be present within it; but the exposure of the contents of the canal by incision, by adding ocular to tangible examination, renders this proceeding most valuable. The indications to be found here may be expected to be of a decisive character, and I believe that the surgeon generally will not be disappointed in his expectations, and on that account I hold a close observance of the condition of parts within the canal to be a matter of very great importance.

It will be recollected that the ordinary oblique inguinal hernia, during its passage through the canal, lies anterior to the spermatic chord. The hernial sac, when left empty after the reduction of its contents, occupies the same relative situation, and consequently overlays and obscures the chord after the canal is laid open. If the reverse of this is found in a case where a hernial descent is known to have previously existed, and the chord is ascertained to be clearly and distinctly brought into view throughout the whole extent of the canal, we may justly conclude that the distinctness and clearness with

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which the chord is seen are caused by the removal and consequent reduction of the hernial sac from over it, which reduction can be effected in no other direction than into the abdomen.

Again, it is well known to all operators on strangulated hernia, that there is usually found a condensed cellular capsule immediately investing the sac, which, in the performance of an operation, assumes a laminated appearance, and often passes for layers of fascia. This cellular capsule has but little connection with the sac, and will remain even when the sac has been reduced. It will, therefore, be worth while to seek for such capsule in our explorations; for, if found, and ascertained to be empty, the circumstance is of a very conclusive character, and moreover will afford a direct clue to the situation of the hernia.

A finger, introduced through an opening made in such capsule, will be conducted towards or through the internal ring, beyond which it will be brought into contact with the hernial tumour itself, having in the introduction passed through the same channel by which the reduction was effected. It must not be expected that such capsule will be found in all cases, because it might escape notice by reason of its tenuity, or, in reductions of some duration before the performance of operation, adhesions and obliteration may be caused by inflammation; yet when found, it is a most valuable adjunct to the other means of diagnosis.

The indications to be noticed at the internal are

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of a similar nature to those mentioned as being found at the external ring, and relate to the size of the aperture and the structures by which it is occupied. With reference to its size, it may generally be expected to be abnormally large, because before proceeding to perform an exploring operation, there will probably be some account received of a hernial descent having occurred, which descent necessarily implies that it has passed below this ring, and consequently through it. For that reason, the ring may be expected to be large, and its borders defined; while its area will or will not be occupied by hernial sac, and the same conclusions drawn from the particular ascertained, as from the same occurrence at the external ring.

It will be observed, that up to this period the proceedings of the exploration have been conducted without any danger of importance, and without any necessary disturbance to the peritoneum, yet information of the most conclusive kind may have been obtained, and such circumstances brought under notice as would fully justify the operation, even if manifold more hazardous than it really is.

It may be admitted, that the whole of the above particulars merely tend to raise a presumption more or less forcible according to the clearness of the evidence which they afford. But the operation may be conducted to a demonstrative conclusion, by ascertaining the existence or non-existence of a hernial tumour, without adding materially to the trifling danger already incurred. This is accom-

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plished simply by the introduction of the finger through the internal ring, and by passing it from side to side. Should a hernial tumour be present, it will at once be recognized, and found lying externally to the general peritoneal membrane, although within the parietes, and presenting a rounded surface and tense feel. Should a tumour be not present, the circumstance may be ascertained by observing the smooth surface of the peritoneum, and the continued adhesions which it maintains with the parietes immediately surrounding the ring.

If doubt still exists, an enlargement of the internal ring, by division of the adjoining transversalis fascia, will afford a clearer exposition of parts, and a more decisive evidence for either an affirmative or a negative conclusion; and thus an exploration may be conducted to its termination, without the necessity of any peritoneal section.

When the doubts have been resolved in the affirmative, by the discovery of a hernial tumour, the tumour may be brought into the inguinal canal, so as to occupy its former situation before reduction, by enlarging the ring to the requisite extent for its passage. It may afterwards be opened, and its contents dealt with according to their condition, as under the ordinary circumstances of common operations.

At this period, the contingencies necessary for the reduction *en masse* should be called to mind, for they will influence the steps of the operation at this stage. Thus it should be recollected, that the cause

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of strangulation must accompany the hernia in its reduction through the parietes, and consequently must be wholly independent of the abdominal rings, which remain unchanged in position. Examination proves, that the contracted neck of the sac is the really efficient cause of strangulation in these cases, and requires similar treatment to that which is usually adopted when a similar cause operates to the production of strangulation on a hernia descending through the rings.

The sac should, in all instances, be opened, and its neck freely divided, so as not to leave any impediment to reduction of its contents into the general peritoneal cavity. It should be recollected, also, that the adhesion of the sac to surrounding parts has been severed, and that, consequently, the sac will be liable to be again reduced, during the reduction of the contents into the abdomen, unless caution be used for its prevention. The danger of this occurrence may be always obviated by the introduction of the finger through the neck of the sac, after the contents have been reduced; for thus the fact of their perfect liberation may be readily ascertained.

Besides the events mentioned as occurring in the cases related, it occasionally, but still more rarely, happens, that the contents of a hernia are reduced into the abdomen, with the strangulation continued upon them, by other causes than the neck of the sac, the detection of which may not be facili-

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tated by noticing the signs suggested for the purpose during an exploring operation.

Thus the hernial contents may be so situated, that some portions may become strangulated by others, or by adhesions formed during the progress of inflammation, or by apertures of the omentum or mesentery admitting through them portions of intestine. These strangulations may take place either entirely within the abdomen, or within a hernial sac protruded from it. If in the latter situation, and the ordinary symptoms of intestinal obstruction supervene, the taxis may be applied in the usual way, and apparently at first with success, because neither the ring nor the neck of the sac, in such cases, may offer any obstacle of sufficient magnitude to prevent the passage of the tumour through the parietes. Yet, as the strangulation is caused by the involvement of the contained parts with each other, and wholly independent of the apertures through which they passed from the abdomen, their reduction is not followed by the expected relief. A certain similarity to the cases related is thus caused, and the suspicion of a reduction *en masse* is thus created.

The suspicion may lead to an operation of exploration of the part. But the signs of a reduction *en masse* before mentioned, as coming under the cognizance of the surgeon during the progress of the operation, will be found wanting; the empty sac, with the obscurity of the chord and rings consequent upon its continued presence, becoming so

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many evidences against such reduction. Neither are there any local signs from which an unequivocal opinion can be formed.

It is probable, that if the parts strangulated remain in the neighbourhood of the ring, a local and obscurely felt tumour, painful over a circumscribed space, may be discovered upon examination, especially after opening the inguinal canal. Thus may be afforded some grounds for suspecting the true nature of the case, yet not sufficiently decisive to render a section of the peritoneum anything more or less than a mere speculative proceeding, with all the contingencies of its doing good or harm to the patient's prospects of recovery.

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OBSERVATIONS

ON THE

MEDICINAL PROPERTIES

OF THE

CANNABIS SATIVA OF INDIA.

By JOHN CLENDINNING, M.D., F.R.S.,

PHYSICIAN TO THE ST. MARYLEBONE INFIRMARY.

READ MAY 9TH, 1843.

LOOKING at disease abstractedly, I should say that no indications exceed in importance the two following, viz.:—

1. The alleviation of acute pain, whether neuralgic, spasmodic, or inflammatory, in its origin; and

2. The securing adequate daily rest in sleep by procuring, artificially if necessary, a suspension at least of any morbid actions or conditions that might militate against refreshing repose. Almost all the suffering, and great part of the danger, of sickness may be referred to uneasy sensations of one sort or other, the irritated nervous tissues re-acting throughout the economy on the nutrient functions,

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deranging the elementary affinities in the blood, undermining the organic powers, and ultimately ruining the general health. Looking again at disease as we see it in clinical practice, there are no medicinal substances of more interest or importance in its treatment than such as are fitted to fulfil these two indications. In the records of medicine there are few results of professional research more striking than the beneficial effects obtained from opium in various diseases.

Satisfactory effects have also been obtained from other agents in our pharmacopœia, of the narcotic class, especially henbane, camphor, prussic acid, belladonna, aconite, &c., in allaying neuralgic pain, or checking spasm, or procuring sleep. But of all our direct anodynes, antispasmodics and hypnotics, opium is undoubtedly that one popularly known in England as the principal, the most powerful, the most certain, and in a word as fairly worth at least all the rest.

But the use of opium has many inconveniences that limit its application very much, so that in cases standing greatly in need of that ease and repose which, under favourable circumstances, opium is so well calculated to yield, we are not unfrequently prevented from employing it. Its tendency is to produce torpor in the stomach and bowels, and to stop the digestive process and the peristaltic actions; and thus to cause anorexia, constipation and active indigestion; it deranges the hepatic and renal secretions as well as those of the mucous linings of the

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whole alimentary canal; it tends strongly to produce headache, vertigo and general discomfort after the cessation of its soporific effects; and these and other inconveniences are of frequent occurrence, and in many cases extremely difficult to obviate in any other way than by abandoning the medicine altogether.

The vast importance of quietude and sleep as restoratives in all grave diseases, whether acute or chronic; the frequent intolerance of opium in individual cases, especially in nervous females, and dyspeptic subjects of either sex; and the inexpediency of its use in a variety of circumstances where repose the most complete is desirable,—these considerations warrant the assertion, that the addition to our materia medica, of any remedy possessing to any considerable extent the virtues without the defects of opium, would be an advantage not easily overrated. Now such an agent I suspect we possess in the Extract. Cannabis Indicæ. This agent seems, like opium, to have been known to the Orientals, and to have been in use as an article of voluptuous excitement amongst the Hindoos for a long series of ages. It was first scientifically tested, so far as I know, by Dr. O'Shaughnessy, of the Medical College, Calcutta; that gentleman was also the first, I believe, to lay the results of accurate observation before the public. The *churrus* (or resinous extract of the *gunjah* or dried Indian hemp) was found by Dr. O'Shaughnessy to possess very striking powers as an antispasmodic, as a nervine stimulant, and as an

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anodyne and hypnotic, and in some respects to excel opium in virtue, especially as an antispasmodic in tetanus, &c. He also observed that it was wholly, or for the most part, free from the deranging action on the stomach and bowels that so limits the utility of opium. Mr. Ley has, I believe the first in this country, published several interesting facts confirmatory of the results of Dr. O'Shaughnessy's experiments and observations; and other gentlemen, possessed of the requisite opportunities, are very probably engaged in clinical investigation of the subject. My attention was called to it only within the last three months, during which I have taken advantage of numerous opportunities of testing the new remedy. The following cases are, I think, favourable, and yet fair, samples of my experience with it.

CASE I.

The first subject nearly on which I made trial of the new remedy was a medical man of forty-four; he has taken it on several occasions: on the first he had no other object than testing its physiological effects, and observing, as far as he could, its mode of operation. At bed-time, being in good health, he took 12 minims of Squire's tincture of Indian hemp, which are equivalent to 1 grain of the extract. In a few minutes he perceived that slight sense of confusion and fullness in the head, with some extra activity in the action of the carotid arteries, which diffusible narcotic stimuli usually produce; and in

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half an hour or thereabout fell into a slumber which lasted, uninterruptedly, for about six hours. In the morning he observed none of the inconveniences which opium usually produces with him, no unpleasant taste nor dryness of the mouth; no want of usual appetite; no derangement of bowels. Now, as this gentleman rarely sleeps more than three or four hours consecutively, except after much bodily exertion during the previous day, which he had not had on this occasion; and as opium, in most circumstances not involving acute pain, produces in him quiet sleeplessness and not sleep; and is next day followed by various inconveniences of acute indigestion,—this experiment may be considered successful.

The same individual took 20 minims of the same tincture on another occasion, to secure sleep under the following circumstances:—Being frequently incommoded by rheumatic irritation in the head, producing frightful dreams, troublesome nightmare, megrims, headaches, &c., he took 20 minims of the tincture of hemp, with ʒfs. spir. ammon. arom. at bed time, and with effects similar in kind to those experienced on the former occasion. He has since taken ʒfs. of the tincture, with ammonia, for a similar head affection, and with very satisfactory effect.

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CASE II.

A patient of forty-four, admitted into the St. Marylebone Infirmary, in August 1842, for ovarian dropsy, suffered much from abdominal pains about the seat of the tumour principally, but also over the greater part of the same side of the abdomen. The pains seemed to be neuralgic, and referrible in part, at least, to pressure by the tumour on the neighbouring organs. She had been tapped many times since admission, to the amount of 12 or 15 pints each time of syrup-like fluid. It was likewise not impossible that malignant structure developed in the ovary might be the seat of much of the intense pain under which the patient laboured. This poor woman for a long time before her death, which occurred in February last, had taken morphia and Battley's solution daily in considerable quantities:—viz. a strong opiate at night, and smaller doses occasionally; and latterly, at least thrice during the day; so that her daily allowance amounted to not much less than the equivalent of half an ounce of common laudanum. In December last, finding the bowels costive, and the stomach deranged, owing, as I conceived, very much to the use of opium, I substituted the hemp. I began with cautious doses, viz. 15 or 20 drops, but soon by gradual additions attained to ʒiſs for a night draught, with æther mixture, which latter she had previously taken with the opium. She took also

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as much as ʒiſs of the hemp tincture repeatedly throughout the day. Under such doses she had quiet nights, undisturbed materially by pain or by cough, which latter had for some time been very troublesome at night. Her bowels were easily regulated by small doses of the dilute aloes pill at night, and she was, for her hopeless condition, in a state of comparative comfort for many weeks. At length, towards the end of February, her powers became exhausted, and her frame to the last degree extenuated, and she gradually sank, and died on the 12th of March.

In this patient, the hemp seemed to have no other effect than as an anodyne and soporific—it caused no indigestion that I could detect whatever.

CASE III.

About the same time, one of my nurses, long accustomed to drachm doses of Battley's solution at night, on account of asthmatic attacks, was persuaded by me to substitute the hemp in like quantity on two or three occasions, and the effects were reported similar and equal to those previously experienced from morphia and Battley, viz. good sleep without interruption by cough, dyspnœa, &c.

CASE IV.

A lady, between thirty and forty, in carrying a glass vessel carelessly, fell on the stairs, and received a wound on the inside of the right carpus

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about an inch in length, and penetrating through the whole thickness of the cutis: the wound was of course ragged, being made by a piece of broken glass; it was dressed with adhesive plaister, over which a wet linen compress was kept in place of a poultice; the part became soon after the accident swollen and painful, and the irritation extended upwards to the shoulder. Being unable to sleep for the pain, she took, about 4 a.m., and according to instructions I had given her, a moderate dose (about 20 drops) of the hemp tincture; soon after which she fell asleep, and rested for four hours without interruption. On this occasion, no repetition of the hemp was necessary; on a second occasion, she took hemp in like manner for a pain in her side, and with like good effect—she suffered no inconvenience whatsoever from the anodyne, on either occasion.

CASE V.

A gentleman's cook, about thirty years of age, had her rest much broken by cough, so much so, that her strength was impaired, she said, for want of rest; on examination, I found sufficient evidence of tuberculation in the right lung. In addition to alkaline and other ingredients for use by day, I ordered for this patient the hemp in half drachm doses at night. These she took repeatedly, and with excellent effect—they procured the needful repose on nearly every occasion of taking them, and in no way deranged her appetite or digestion.

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CASE VI.

On the 10th of February last, I commenced the use of hemp in low doses, in the case of a rheumatic female, twenty-two years of age, admitted 14th January 1843: she had been out of place for twelve months, and had been a month ill with pain of knees and elbows more particularly, which prevented sleep, and were much complained of; she had had opiates at night, and iodide of potassium and iodide of iron during the day; her sleep being still disturbed, and her head aching, I gave her hemp. At first the new medicine had no important effect; the second night I doubled the dose, then tripled it, and she told me she passed good nights with the half drachm doses, which she took from February 15, to her discharge a few days after; she perspired under its use every night, her tongue was clean in the morning, her appetite good, and she took it regularly for about a week, when she was discharged, well.

CASE VII.

A man of thirty-seven, a labourer, admitted February 8, with emphysema and tuberculation of the lungs; had been short-winded from two to three years, had palpitation, never had hæmoptysis, breathing humeral, (viz: the shoulders rose and fell with inspiration and expiration,) coloration of

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face rather dark, much resonance of lower lobes, dullness of right upper lobe. This man had repeated doses of the hemp, but from the 10th, when I began with it, to the 19th, when he was taking fl. ʒij doses every night and morning, there was no satisfactory effect; on the 19th, he reported he had a good night, with relaxed bowels in the morning. The same doses continued, produced equally good effects. He died at the end of a fortnight after admission, having had to the last relief from cough, &c., and ultimately such an euthanasia as medicine is capable of affording.

CASE VIII.

A female shoe-binder, fifty-nine years of age, admitted February 6, for rheumatic gout. She had been for years subject to the complaint. Left hand and both knees swollen and tender, little fever, bowels open, pulse rather quick. This patient had considerable relief in a few days in her hand and knees, from an effervescing solution of colchicum and tartrate of potash, which purged her moderately and stimulated the kidneys. But she had no rest at night, from pain in her extremities principally. I then ordered for her the hemp in doses gradually augmented, from a dozen drops of Squire's tincture to twice and thrice that quantity, and her reports were as follows:—13th.—Had slept very well from her first dose. 15th.—No sleep, owing I think to disturbances in the ward by a delirious patient. 17th.—Slept nearly twelve

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hours. Tongue clean. Bowels open. 18th.—Similar report to the last. 20th.—Two last nights both good. Complaining now most of weakness in her limbs. After this, owing to the supply of hemp being out, she had none for two nights, when she had no rest from pain of her limbs. 27th.—Two last nights slept well after hemp draughts.

28th.—An exacerbation of rheumatism in her left hand and shoulder—pulse quick, tongue coated—I ordered antimonial mixture with hemp tincture, ♏ xx 4tis. horis. For this I substituted, next day, March 1st, effervescing solution of tartrate of potash with 20 drops of hemp tincture every four hours: this medicine soon purged and gave relief. On the 3rd, she reported herself much better; had rested very well; her hand was better. On this plan she continued for about three weeks, when she was discharged in her usual health.

CASE IX.

A tradesman, about fifty years of age, consulted me for a chronic cough. On examination, I found unequivocal evidence of tuberculation of the right lung. His rest was disturbed by cough, so that he could not follow his trade, from weakness. I gave him a mixture of alkali, gum, diuretics and tincture of hemp (♏ x to xx), four times a-day—a blister also was placed between his shoulders. Speedy advantage was derived from this plan; the cough became less troublesome, the breathing easier, and

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the general feeling of comfort improved, while no inconvenience of any kind was experienced in the digestive functions. This patient is still under the remedy, with uninterrupted benefit.

CASE X.

A tailor, twenty-two years of age, admitted 7th of February, with cough of some months standing,—the sputa had been bloody; there was depression, with dullness, and imperfect expansion of the right subclavian region—had lost much flesh lately—cough prevents sleep. This patient took small doses of opium in different forms, with little advantage, until the 12th of February, or fifth day of treatment, when I began with 20 minims of the tincture of hemp: he experienced improvement. On the 15th (eighth day), he reported a better night, with more appetite (in consequence, possibly, of more refreshing sleep); notwithstanding gr. ¼ doses of tartar emetic 4tis. horis, given on account of active congestion or pneumonia of the right lung. I ordered a mixture of tragacanth, liquor potassæ, and tincture of hemp (℥ x), 4tis. horis—this was continued, with ʒfs of the tincture, at bed-time, till his death.

March 6th.—Up to the last moment he experienced relief from the hemp—viz., sleep at night, and quiet from cough by day, without any derangement of stomach, &c.

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CASE XI.

A female, twenty-four years of age, admitted March 2nd, for chronic cough—she had been unwell for two or three months, but never was strong; she had had cough since childhood, when she had hooping-cough; her cheeks were flushed—pulse about 120—tongue coated as if covered with rhubarb—bowels habitually confined—slept ill from pain of side and cough; her left lung was generally dull and inexpansible, and without normal penetration by air in breathing; she complained much of pain in the left side in breathing, coughing, &c.; her sputa had traces of blood. There was no amendment on the third day, and she wanted to go home. I then changed her medicine for effervescing solution of tartrate of potash (ʒfs) and tincture of hemp (ɱ x), 4tis. horis. Next visit—the fourth day of treatment—things seemed much altered for the better: the medicine had acted on the bowels. She had an excellent night, and expressed herself as feeling much better. Tongue cleaning—pain of side much relieved—want of resonance, penetration, and expansion in the left lung not materially altered—the active congestion was abated, but consolidation continued, and her amendment was in time and kind such as could happen only in a nervous subject of tuberculated lung, upon which congestion had incidentally supervened, and was again receding, leaving the lung, in point of density and degenera-

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tion, in nearly the same condition as before its accession. This patient was discharged in comfortable health on the eighth day.

CASE XII.

A lady, past fifty, generally in pretty good health, took some medicine of an aperient nature, on account of indigestion. Owing to some error as to quantity, or to some unusual susceptibility at the moment, the medicine acted violently, causing much pain and discomfort. For this she, of her own accord, took a dose of Squire's tincture of hemp, equivalent to about a grain of the extract; very soon after taking the medicine she experienced relief, passed the evening without further inconvenience, and had a particularly good night, not followed by indigestion, headache, or other unpleasant effect next day. Soon after, the same lady was attacked with influenza and swelling of the face, when she had again recourse to the hemp tincture—15 minims of which gave her uninterrupted rest for seven or eight hours. This lady has not for many years been able to use opium in any form, on account of racking headache and other distressing effects invariably produced by it, even in very small doses. She experienced no inconvenience from the hemp on either occasion.

CASE XIII.

A medical practitioner, long in the habit of using

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morphia daily, to check cough and secure sleep, was persuaded by me to give the hemp a trial. This he did the more readily because he often suffered from headache, heaviness, &c., about the head, want of appetite, irregular bowels with frequently white clay-like stools, which he suspected might be owing to the morphia. This gentleman has for some weeks used the hemp in tincture through the day, mixed with water, with which it makes a sufficiently agreeable emulsion; and in pill at night, in doses perhaps double in quantity compared with the opiates he had previously employed: and he experiences the same relief from cough, and sleeplessness, as from morphia, and without drawback in the shape of headache, indigestion, &c.

CASE XIV.

A woman of thirty-five, a sempstress, was admitted on January 13th, for rheumatism. She had been subject to rheumatic attacks for years. When admitted, she had swelling and tenderness of one ancle and both knees: she had no fever, and was pale and feeble. Guiacum mixture and iodide of iron were successively given her; then effervescing solution of the tartrate of potash and warm baths, but no benefit resulted, and she especially complained of sleeplessness from pain in her limbs. On the 8th of February, I began with hemp in low doses, and gradually raised them to half a drachm. From the first there was apparent effect, and on the 12th she

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reported a very good night's rest, after xxv minims of the tincture.

15th.—Bad night, owing, apparently, to no hemp having been given, on account of the small stock I had procured for trial being exhausted. After this she took the hemp regularly at night, as far, at length, as xlv minims, and usually with satisfactory effect as to her night's rest, and without subsequent inconvenience. On the 21st and 22nd, however, she had no hemp, and, in consequence of the omission, I conceive, had no rest either night. She was discharged on the 26th, because she would not submit to the magnetic-electric current, ordered for daily use in her case, as a discutient and local tonic.

CASE XV.

I have given more than one case in which troublesome cough was checked by the hemp. The following is another form of cough usually very unmanageable by antispasmodics, in which, so far tried, the new remedy promises good effects.

An infant nine weeks old was admitted for hooping cough, which had but just shown itself. I began at once with hemp tincture ♏ ii in tragacanth mixture, 4tis. horis. On the 27th February, fourth day of treatment, I ordered the same medicine, 3tiis. horis. On the 28th, the cough was still rather frequent and violent, and the nights consequently bad; he vomited less however, and but once after cough-

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ing, which shows that the violence, if not the frequency of the cough was somewhat abated.

March 3.—Cough reported still bad at night, viz. fits occurred repeatedly and often enough to prevent proper sleep. I increased the dose to iij minims 3tiis. horis. On the 6th reported to have been wakened but twice in the night by the cough; to have had but two fits of coughing the previous day, and but one to-day. Finding the medicine agree well, I increased the dose iv minims 3tiis horis.

15th.—Reported much improved within a few days; coughs but once with hoop in twenty-four hours; the mother says that she gives the medicine on the whole regularly; but oftener at night because the cough is then more frequent. The child looks well, and will probably very soon be discharged perfectly well.

Fever Cases.

In the course of the week commencing Feb. 24, I received into my wards half-a-dozen or more cases of spotted synochus and typhus of an asthenic character, with feeble often-jerking pulse, dry tongue, copious appearance of spots and stigmata, especially about the body; low delirium, and, in nearly all the cases, tremulousness of the tongue and limbs, amounting in several to subsultus and jactitation. They were cases in which little was indicated in the way of active medication. Quietude, ventilation, dilution, and gentle action on the abdominal functions, with

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cold to the head, were the means first to be thought of; and afterwards moderate stimulation was likely to become necessary. The former views were met by the effervescing draught every four hours; by shaving the head and applying cold lotions, &c.: and the latter by wine in moderate quantity where it was deemed necessary. The fever was a low nervous one, pathologically allied to a common form of delirium tremens, and analogy suggested the use of some narcotic more efficient in conciliating sleep than any of the vinous kind. It appeared to me that opium was inadmissible. On the one hand the secretions were much deranged already, while the mischief from disturbed nights appeared by no means sufficiently pressing to warrant the use of so equivocal an agent, except in combination with mercury, aloes, or other corrective of disordered abdominal secretions. Now, the cases before me exhibited the usual tendency to diarrhœa, so that I considered it inexpedient to use any thing by which active purging might be excited. Under those circumstances I thought that I might give the hemp a trial.

CASE XVI.

The symptoms of fever were in all so much alike, and the asthenic character in all so distinct, that it is not necessary or expedient that I should give details of each case by itself. I shall, therefore, sketch separately the first case in which the hemp was used by me, and then advert generally to the others.

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Feb. 24th.—In the evening a man was admitted twenty-two years of age, and about ten days ill with feverish symptoms. I saw him on the next day, and found that since his admission, spots had appeared, such as occur so often in the low fever of London; his tongue and hands were tremulous; he had had no delirium, but yet spoke of being light-headed; the pulse was about 120, rather jerking; bowels open; tongue, a creamy thick coating. I ordered the effervescing draught 4tis. horis.

Feb. 26th.—Bowels reported rather loose; much delirium in the night; pulse as before; much thirst; ordered, *affusio frigida* (cold dash or current) *capiti ter quotidie*, and superseded the effervescing saline, as too aperient, by the mixture of acetate of ammonia.

27th.—Bad night again; delirium wilder than before; and more subsultus tend. Ordered *Træ Cannabis Ind.* ʒfs. *h. s.*

28th.—Says he "slept none at all last night;" but that he "has slept this morning;" "has no headache at all;" he is more sensible than he was. Tongue moist; brown in centre; "feels himself a little better;" nurse says he slept much more than before taking the hemp. Ordered *Træ Cannabis Ind. fl.* ℈ij *spir. ammon. arom.* ʒfs. *h. s.* also a blister between the shoulders.

March 1.—Slept two hours after the hemp, and again a couple of hours this morning; pulse 120, soft, good size; tongue moist and much less brown; less thirst; bowels open; looks improved; ordered hemp and ammonia as before.

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March 2.—" Thinks he slept pretty fair ;" nurse says he slept well ; bowels open ; tongue moist, with creamy sides and brownish centre ; pulse 120, steady, not bounding, soft and of good size ; " no pain whatever ;" had a little quiet delirium during the night, without outcry of any kind or vociferation ; two stools in the night.

March 3rd.—Good night; pulse 80 to 90; tongue dry, stiff and dark; no pain; bowels open; less thirst.

5th.—Tongue nearly clean ; " slept very well indeed." This patient is now on full diet, and on the point of leaving the house.

CASE XVII.

A second case of the same fever treated with a cold dash and effervescent salines during the day, and hemp at night, was that of a lad of 18, admitted February 27th, and to be discharged well to-morrow. This patient's symptoms, remedies and medicinal effects were precisely the same as those of the last case (16), so that I shall give no particulars regarding it.

CASE XVIII.

This was a case of a man admitted Feb. 24, and in the main agreeing with the other two; but differing in the age of the subject (52 years) and the absence of delirium. All other symptoms, whether having reference to the brain and nerves, or skin,

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or abdominal viscera, were the same as in the others. The tremors were obvious in this man at my first visit. He was treated with effervescent salines and composing draughts of hemp, with cold stream to the head, and the same results were obtained as in the other cases; saving that, owing to his age, no doubt, he required more wine, and recovered more slowly, though originally less dangerously ill than either of the preceding. He is now convalescent.

Of some other cases of this fever, two died from complications; the one in the brain and the other in the thorax. The man (Case 18) required, for about a week after March 2, a few ounces of wine daily, none of which had been required by the other Cases (16 & 17), on account of *fever*, though one had a little after, *to hasten convalescence*.

Observations.—The objects I have had in view in the trials of the hemp above detailed (which, I may mention, are but a third or fourth part of the whole number of cases in which I have experienced beneficial effects from the new remedy) are these :—

1. To determine as nearly as I could, the question, whether the hemp narcotic be in reality possessed of medicinal properties sufficiently energetic and uniform to entitle the drug to admission into our pharmacopœia; and,

2. To determine how far the extract could be used with advantage as a substitute for opium in various important diseases, acute and chronic.

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In answer to the former question, I have no hesitation in affirming that in my hands its exhibition has usually, and with remarkably few substantial exceptions, been followed by manifest effects as a soporific or hypnotic in conciliating sleep; as an anodyne in lulling irritation; as an antispasmodic in checking cough and cramp; and as a nervine stimulant in removing languor and anxiety, and raising the pulse and spirits; and that these effects have been observed in both acute and chronic affections, in young and old, male and female.

In reply to the latter question, I should say that these useful, and in several cases most salutary effects have been obtained without any important drawback or deduction on account of indirect or incidental inconveniences. Thus, I have hitherto experienced no difficulty in keeping subjects of pulmonary disease under the constant operation of a narcotic, which repressed to a most important extent their mischievous cough, and secured them refreshing rest, without causing in the least degree anorexia or indigestion, or, with one or two doubtful exceptions, any inconvenient result or sensation whatever. Thus, again, I have repeatedly had a subject of articular rheumatism or severe bronchitis under the double influence at once of a diuretic-laxative medication and of an anodyne-antispasmodic; the saline solution, with or without colchicum, correcting the blood and secretions unimpeded by the narcotic, whose whole influence appeared to be expended on the tissues, seats of pain and irritation. For a third example I may

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refer to the use of the hemp in low fever, in securing the enjoyment of that great restorative in acute disease— viz. tranquil sleep; and producing this benefit without any neutralizing inconvenience, without causing constipation, nausea, or other effect or sign of indigestion, without headache or stupor.

The only class of cases in which I have found the hemp not to act as a competent substitute for opium, is in the intestinal fluxes, such as the diarrhæas of phthisis and of low fever in advanced stages, of old ulcerations of the bowels, &c., and in dysenteric affections. In such cases, opium is the great controlling remedy of the narcotic class, and admits of no deputy. And in such cases, happily, opium produces in judicious hands none of its inconvenient effects, and may usually be safely and freely employed.

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ON THE

SUGAR IN DIABETIC BLOOD.

By HENRY BENCE JONES, M.A., Cantab.,
LICENTIATE OF THE ROYAL COLLEGE OF PHYSICIANS.

Communicated by Dr. NAIRNE.

READ MAY 9TH, 1843.

In 1841 Professor Mitscherlich communicated to the Academy of Sciences, in Berlin, a new method of distinguishing between cane and grape sugar, the discovery of H. Trommer, who had himself applied it to the detection of sugar in diabetic blood, but without success, although he found when $\frac{1}{10000}$ part of grape sugar was added to healthy blood it could be afterwards recognized by this test. Hence the conclusion was drawn, that as this most direct and delicate test failed to detect the sugar in the blood, that therefore no sugar was present there in this disease.

M. Rayer, in his Treatise "*Sur les Maladies des Reins,*" states that M. Guibourt at his request repeated the experiments of Mr. Macgregor, Dr. Maitland, and Dr. Rees, but that by fermentation he could obtain no evidence of the presence of sugar in the blood.

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The delicate test of M. Trommer consists in the perfect solution of the precipitate which first forms when caustic potash is added in excess to a solution of sulphate of copper and grape sugar, and the after formation of a peculiar coloured precipitate by heating the mixture. The first part of the test is not sufficient without the second, nor the second without the first: for cane sugar will give the same clear, blue, solution, without giving the peculiar precipitate afterwards. And uric acid used instead of sugar gives the same precipitate by heat, but does not give the clear solution.

An opportunity offering, I repeated the experiment on the blood.

Thomas Saxby, æt. 30, grocer, was admitted Jan. 20th, 1843, into St. George's Hospital, under the care of Dr. Nairne. He had been living in Sussex, was stout, florid, light hair; pulse full; skin very dry; bowels confined; tongue white. Had been attacked with looseness and vomiting about thirteen months previous to his coming to the hospital. Before this time he was quite healthy; free from rheumatism, gout, indigestion, or skin disease (excepting scabies). He suffered from the above complaints for a week, and as he recovered, he felt much thirst and weakness. He then for the first time observed an increase in the quantity of water, and was troubled with a frequent desire to pass it.

On admission he complained of these symptoms, with heaviness and weight after taking food.

Jan. 24.—He was bled to twelve ounces, three

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hours after dinner, which consisted of about six ounces of bread and twelve ounces of meat, with no vegetables. The following morning the blood was well separated; the serum was milky; the clot slightly buffed and cupped.

The serum was poured off nearly free from the blood globules. A bottle filled with it at 57° F. weighed 516·46. The same bottle, with distilled water at the same temperature, weighed 506·56. The specific gravity at this temperature was 1029·7. It was alkaline. Thrown on a filter, it passed through milky, but when treated with æther it became perfectly clear. When examined with the microscope, these globules of fat were so small as not to be distinct when magnified 640 diameters. To about a drachm of serum, three drops of a strong solution of sulphate of copper were added, and then an excess of caustic potash: a dirty blue precipitate first formed, which did not dissolve, but only became much darker when heated, partly in consequence of the dark purple which is formed when sulphate of copper and an excess of caustic potash are boiled with albumen or fibrin. It became necessary, therefore, to remove the albumen before the test was applied. 516·4 grains of serum were evaporated to dryness in a water bath. The residue was reduced to a fine powder, and then treated with cold water, which after standing for some time, was filtered. The fluid which passed through was slightly yellow, clear, and of a strongly saline taste, and when tested with sulphate of copper and an excess of potash

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the precipitate which first formed dissolved entirely, and then on the application of heat a reddish yellow precipitate formed. About three ounces of the clot from the same blood were evaporated in the same way, when, powdered and treated with warm water after filtration, the first-formed precipitate dissolved, and then, by heat, the same re-action ensued as before.

The same quantity of healthy serum as in the first experiment, was treated in exactly the same way. The clear fluid also tested in the same way did not dissolve, and when heated became black.

In two fluid ounces of clear serum I put 0·15 of a grain of diabetic sugar dissolved in water, after evaporation, &c. I was unable, by the above test, to obtain a satisfactory proof of the presence of the sugar. In testing diabetic serum, it is essential first to get rid of all the albumen by evaporation to perfect dryness; secondly, to extract the sugar from the albumen by reducing it to a very fine powder, and treating it with water for a considerable time; thirdly, not to render the test obscure by forming too much peroxide of copper; on this account, but a drop or two of sulphate of copper should be used.

The urine passed between three hours before the bleeding, and nine hours after, amounted to about five pints. It was acid to test paper. Very light straw coloured, specific gravity 1031·3, and, tested in the above-mentioned way, gave a very large precipitate, which was at first bright yellow, and after some hours became dark green.

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In two ounces of healthy urine 0·15 of a grain of diabetic sugar was dissolved, and the test was most sufficient.

From the preceding observations it is clear that it is easier to discover sugar in the urine than in the blood; in which last, though it may sometimes be detected, yet, at other times, it may be in so small a quantity as not to be recognisable by the most delicate test.

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A FEW OBSERVATIONS

ON

ENCYSTED HYDROCELE.

By ROBERT LISTON, Esq., F.R.S.,

SURGEON TO UNIVERSITY COLLEGE HOSPITAL.

READ MAY 23RD, 1843.

The subject of hydrocele has been so frequently and so well treated of both by ancient and modern surgical writers, that it may appear superfluous and presumptuous in any one to attempt its further elucidation.

An observation made lately, induces me, however, to believe, that some of the collections in the scrotum are more intimately connected with the testicle or its seminiferous tubes than has been generally supposed.

Encysted hydrocele had been distinguished by many of the old writers, from the collection in the tunica vaginalis, constituting simple hydrocele, and it is noticed as being sometimes mistaken for a third testicle; individuals not unfrequently present themselves to surgeons under these circumstances, and who flatter themselves that they are thus unusually provided.

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The situation of the tumours, which are caused by fluid accumulated elsewhere than in the tunica vaginalis testis, has been well indicated by Mr. Pott in his admirable treatise, and by Mr. Hunter in his surgical lectures.

Sir B. Brodie, in his lectures on diseases of the contents of the scrotum, in the Medical Gazette, vol. 13, has also thrown some additional light on the subject, and has referred to various dissections he had made. The collections forming encysted hydrocele are described as occurring,—

I. On the testicle, betwixt the albuginea and tunica vaginalis—at first as small transparent cysts, but gradually increasing in size.

II. As presenting by the side of the epididymis, betwixt that body and the reflection of the tunica vaginalis from the testis.

III. As appearing in the course of the spermatic chord above the testicle. In this latter situation, no doubt, collections of various kinds are to be met with in the loose filamentous tissue of the chord; in the unobliterated portions of the spermatic process covering that body; or, possibly, in more immediate connexion with the vas deferens itself.

Fluids of totally different nature will, therefore, be apt to be evacuated from what have been denominated encysted hydroceles of the chord, and we accordingly find serum of various shades of colour, but with all its distinguishing characters; or again, a clear and limpid fluid discharged in different cases.

When an encysted hydrocele (to preserve the old

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denomination of these tumours) is of small size, it may often be distinguished by its relation to the testicle, from the common hydrocele of the tunica vaginalis testis. But when it attains, through time, a large size, the diagnosis is frequently exceedingly difficult, if not impossible.

When a surgeon of some experience in these matters, after satisfying himself that a swelling of the scrotum consists of a distended cyst, has proceeded to evacuate it, and has found, instead of serum, that a limpid and almost colourless fluid runs off, he generally sets the case down as one of encysted hydrocele, whether the tumour has occupied the scrotum, or has been seated in the course of the chord.

It has commonly been very well understood, that such limpid fluid contains little or no trace of albumen, and it has been also acknowledged, that cysts which have contained fluid of this kind do not undergo the same process when inflammation is excited in them as serous cysts do; — in other words, that a cure of such hydroceles, by injection, is not to be looked for.

One object of the present communication is to give a rational explanation of these circumstances.

I had very often met with cases of cysts furnishing limpid fluid, had punctured some repeatedly, had attempted a radical cure of others by incision, or tent, or by seton, but had contented myself with examining the fluid and testing it by heat, nitric acid, &c.

Some nine or ten months since, I was consulted

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by a healthy looking gentleman, beyond the middle period of life, on account of tumour of the scrotum. There was plainly fluid on both sides. The largest cyst was punctured, and gave exit to some eight or ten ounces of thin fluid, which might be compared to distilled water, with a little soap diffused through it. The other side of the scrotum was punctured a few months afterwards, and, as far as I can recollect, ordinary looking serum, to the extent of five or six ounces, was discharged.

A short time since, the patient returned, to have the original cyst again emptied. About the same quantity of fluid was drawn off, and of the same quality as at first. This fluid was examined chemically, and scarcely a trace of albumen could be detected.

On the second day, a minute quantity was put in the field of the compound microscope, and my surprise was great indeed when it appeared quite full of spermatazoa—there were besides to be detected some of the primitive cells, in which the spermatazoa are developed, and a certain number of mucous globules.

It is to be regretted, that the microscopic examination did not take place immediately after the fluid was obtained, so as to have ascertained whether the animalcules presented their usual liveliness of motion.

The opportunities of examining cases of the kind anatomically are, it is well known, now rare, seeing that testicles are not extirpated as they used to be

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for every trifling alteration of form or change of structure. I have made inquiries on the subject, and have examined carefully various preparations. In some, cysts are formed behind the testis; others in the fore part, projecting into and covered by the reflected tunica vaginalis, and no doubt by the tunica albuginea also; other, and in some instances numerous cysts are seen above the testicle—multilocular hydrocele of the chord. There is one specimen which, through the kindness of our President, I had the opportunity of examining, which seems to throw more light on the subject than any other which I have seen. The description of it is copied from the catalogue of preparations in the collection belonging to the Bartholomew Hospital School. There is no history attached, and no account of how it was obtained.

"Testicle with part of the spermatic chord; along the epididymis there is a series of membranous cells communicating together, and having for their outer boundary the tunica vaginalis, and its reflexion between the testicle and epididymis. *These cells contained a transparent and colourless fluid.* A bristle is passed beneath the vas deferens near its connexion with the epididymis."

Here the sac is closely connected with the epididymis, *if not an actual dilatation of its lesser head.**

* There is also a preparation in the collection of Mr. Bransby Cooper, in which a cyst is seen connected with the upper part of the epididymis, pushing the tunica albuginea of the testis before it, and projecting into the cavity of the tunica vaginalis. Mr.

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This subject deserves further investigation, to discover, first, if the limpid fluid drawn from cysts of the scrotum and inguinal region, uniformly or often contains spermatazoa.

Secondly, what connexion subsists betwixt the seminiferous tubes and their cysts.

Thirdly, whether or not dilatation of parts of the epididymis or vas deferens, obstruction or otherwise, may not, in some instances, give rise to these collections.

If so, this being a pouch lined by mucous membrane, we should have an easy solution of the difficulty regarding a radical cure, not following injection as in the serous cyst. The microscopic examination of the lining membrane of a recent cyst would easily settle the nature of the secretory surface.

P.S.—The preceding observation has been confirmed by examination of the fluid from a small cyst above the testicle of a man æt. 53.

He applied to be treated for bad stricture of the urethra, which had frequently given rise to retention of urine.

The fluid of the hydrocele, in this case, was

Cooper punctured this cyst, and drew off three or four ounces of limpid fluid, which contained scarcely a trace of albumen. The patient died of pneumonia a few months after the operation, and the preparation being obtained, showed the sac somewhat contracted, though gradually refilling.

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nearly transparent and colourless. It was found, on examination, to contain numerous spermatazoa, some of which continued to move actively for some considerable time after the fluid was drawn from the cyst.

This was made manifest to some practitioners who were present, and to many of the pupils of the hospital.

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SOME ACCOUNT

OF

AN EPIDEMIC

WHICH PREVAILED AT TEHERAN, IN THE MONTHS OF JANUARY AND FEBRUARY 1842.

IN A LETTER TO GEO. JOS. BELL, M.D.,
TRAVELLING FELLOW OF OXFORD.

By C. W. BELL, M.D.,
ATTACHED TO H. B. M.'S MISSION AT THE COURT OF PERSIA.

Communicated by ALEXANDER SHAW, Esq.

READ MAY 23rd, 1843.

Teheran, 22nd Feb. 1842.

I have had much trouble and anxiety of late, with a very curious new disease, which made its appearance in our neighbourhood, and thence spread to different parts of Teheran.

It occurred nearly simultaneously with an anomalous complaint in Baghdad, and was, probably, analogous. This, I understand, has been described by Dr. Ross, of Baghdad, in a report (which I have not seen) under the title of epidemic *angina pectoris*. I give you, however, an extract from his letter to me on the subject, dated Baghdad, Dec. 30, 1841 :—

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" We have got a most curious disease raging here, just now, more like angina pectoris than any thing else. But it proves fatal in an hour or two. In fact, though eight or ten of my personal friends have died from it, I have not yet been in time to see a case while life remained. You knew several of them while here. Old Mahomed Aghaiba, Chederakee, Ismael Beg, &c."

The only thing that I have to remark of that disease, before proceeding to a detail of cases, is, that in the one I am about to describe, the fits appeared to be always accompanied by a nervous excited action of the heart and arteries, periodical, but neither preceded by chill nor succeeded by perspiration. Those who suffered from numbness and sleeping of the hands and feet alone, had always more or less palpitation of the heart, at the same time, sometimes amounting to pain.

The first patient I saw, which was a short time before the receipt of Dr. Ross's letter, was Syad Khan, who happened to be my neighbour. Having stomach-ache, to which he was subject, he took ten drops of the oil of peppermint, instead of the spirit which he was in the habit of taking, and it produced inflammation of the stomach. I applied 30 leeches to the epigastrium, by which, and other means, the inflammation was subdued. He was convalescent and in good spirits, only considerably reduced in strength, when he was suddenly attacked, about ten at night of the 20th of January, with a fit resembling epilepsy; became insensible, and died in half

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an hour. I saw him in this state, convulsed, the mouth drawn to one side, moaning and insensible, pulse quick, but rapidly sinking. I was wholly at a loss to account for his death, and imagined fifty things; but a *post-mortem* examination was out of the question.

At this time anomalous local pains, some like tic douloureux, were becoming remarkably prevalent.

On the 23rd January, Mr. R., æt. 40, accountant to the mission, of gouty diathesis, who had been formerly subject to ague, and latterly every six or eight months to plethora, complained that he had suffered much from headache for some days, and that last night, on putting his feet into warm water, the left foot was seized with numbness, as if asleep. At present, however, the pulse is good and soft, and he has no particular symptoms: ordered 2 pills of calomel and colocynth at bedtime, and compound jalap powder in the morning.

23rd.—Last night, at midnight, was seized with excruciating headache, and spasms, and numbness of the left leg and arm; the pain continued severe till 8 a. m., when it gradually abated. The medicine operated only once. To repeat the dose at night, and take salts and senna in the morning.

24th.—Has had similar attacks of pain and numbness of the whole of the left side, last night exactly at 12, and at 10 in the morning. Although somewhat relieved since 8 o'clock, has still much headache and some numbness of the hands. The medicine has operated little. Pulse full and bounding,

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v. s. ad ℥xx. Five grs. of calomel immediately, and castor oil two hours afterwards. This produced two full evacuations.

25th.—The pain returned at midnight, but was less severe, though continuing more constant in the morning. The spasms and sleeping of the left side the same as in the preceding night. To take ext. colocynth comp. gr. v and ol. croton ♏ $\frac{1}{12}$, immediately and at noon; after which, every two hours, to take a grain of quinine, and two at 11 p. m.

26th.—Nightly accession of headache much less, but the numbness of the leg and arm came on at the same hour. To take rhubarb and magnesia ℥j immediately; and from 2 in the afternoon, to take one grain of quinine every hour, and three at 11.

27th.—Has still headache, the pain shifting a little to the cheek; had no accession at midnight, but still has sleeping of the leg and arm at the same hour. He went to office for an hour or two, but felt giddy, and had several spasms in the hands.

At four and a-half p. m. was suddenly seized with a fit like epilepsy; convulsions; face and breast became mottled purple; pulse good, without much power; hands and feet cold. He recovered his consciousness in a few minutes, but above an hour elapsed before the memory was completely restored. The pulse getting low, he had some spir. ammoniæ aromat. in water, and hot fomentations to the stomach. The headache continues severe, but the senses perfectly restored.

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10 p. m.—Suddenly attacked with a second fit; face drawn to the left side, right arm and side affected with spasms, left apparently paralytic, frothing at the mouth and stertor, insensible. This attack lasted about ten minutes, the pulse bounding with extraordinary excitement—consciousness had already returned before v. s. ad ʒxx was performed. Has had no motion since yesterday forenoon. Capiat statim ol. croton tiglii ♏j, ex olei ricini ʒfs. This was vomited immediately. A dose of scammony and jalap was then given, which was retained an hour and then vomited. Expecting another attack at twelve, I took care to be present a few minutes before the time, when, exactly at the hour, he was again attacked, more severely than before. Powerful convulsions of one side; for a short time, quite purple in the face and chest. Two or three severe opisthotonic spasms, and horrid grinding of the clenched teeth, as in tetanus. Total insensibility—pulse about 90, very powerfully excited, so much, that although convinced that this disease was purely nervous, and little likely to be benefited by bloodletting, and that when this violent excitement passed, it would be succeeded by a condition of proportionate feebleness and prostration, yet I found it absolutely necessary to bleed again, in order to protect the brain. This time sensibility returned more slowly, with expressions of intense suffering from pain in the forehead. To have an injection of magnesiæ sulph. ʒj; ext. colocynth co; pulv. jalap. rad. āā ʒj; in warm water, immediately.

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2 a.m.—Has vomited three times frothy mucus. Injection retained—repetatur enema; calomel gr. v. statim.

28th., 10 morning.—The second injection brought away little but the first one. Fœtor of breath, either from the calomel or from the tongue having been severely lacerated in the last attack of convulsions. Still much excitement of the pulse, although less in power and volume. Headache excruciating, till eight a. m.; when, as usual, it abated, though still severe. Some pain in the region of the heart, the excited action of which is singular. Bowels not free. Borax lotion for the mouth. Enema of jalap and colocynth, āā ℈j; and to take every two hours one of the following pills,—℞ ferri carb. ʒſs; assafœtidæ ℈j; fiant pilulæ x. A blister to be applied to the region of the heart.

4 p. m.—The enema brought away a little dark fœtid matter. There is much drowsiness and disinclination to move; but he is perfectly sensible—headache gone, and no numbness, but weakness of the limbs; pulse gentle, soft, and weak—wholly free from excitement—some pain in epigastrium, slight hiccough, but no return of vomiting since commencing the pills. The enema to be repeated, and to take a glass of wine with arrowroot.

12 p. m.—The enema brought away some dark fluid, smelling of assafœtida: no attack to-night—omit medicines.

After this he took, for a couple of days, carb. ferri ℈j, in syrup of ginger, twice a-day, which acted

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gently on the bowels;* and, except having for a few days a good deal of feebleness, he has since been perfectly well.

Baba Beg, æt. twenty-four, of florid complexion. On the night of January 27, on returning from Mr. R—'s, I found this man recovering his sensibility, after having had two successive *fits*, which he says were each time preceded by great palpitation and painful oppression of the heart; the pulse is now 85, excited and bounding, but without much power. He has been disturbed for some nights past about the same hour, by sleeping of the right arm; and two nights ago, had a slight fit. His fellow-servants tell me, that during the fits his hands were convulsed and face distorted. Ordered compound jalap powder and calomel.

28th.—Purged five or six times; to take ten grains of carbonate of iron, and repeat it in the afternoon. After this he had no return of symptoms.

Rassool, æt. thirty, my head groom, a spare man, 24th of January, complained of much pain and tenderness of the ears and parotids. I had several patients at this time who complained of the same thing. Ordered Epsom salts ℥j immediately—five leeches behind each ear.

25th.—Medicine operated frequently; he feels

* This is a curious fact, which I have observed throughout the whole of the diseases of this year—that while, as frequently happened, none of the usual purgatives produced their effect, a small dose combined with iron acted immediately, as scammony gr. v. ferri carb. gr. x., or ferri sulph. gr. j. aloes gr. ij.

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better, but there is still much tenderness and pain—has been disturbed for the last two mornings, by the arm and leg of one side going to sleep a little before daybreak—countenance flushed, pulse 90, v. s. ad ℥viij.

26th.—Pain easier, hands still sleep in the morning,—compound jalap powder ʒj immediately, and ten grains of Dover's powder after the third motion.

27th.—Has been freely purged. Occasionally great numbness of the limbs, and headache; in the evening was said to have fainted.

28th.—Still purged, looking worn, pulse much excited, numbness of both legs and one arm; severe headache—cap. ferri carb. gr. x; et repetatur post horam.

Evening.—Has been purged several times since morning, and has not taken the powders; headache very bad. Ordered pills of assafœtida, sulphate of iron, and opium, every two hours.

Midnight.—Pain in head excruciating; lower limbs insensible, in a state resembling paraplegia, and one arm quite numb—shows great disinclination to move, has refused all medicine, wishes to be left to die—said to have been twice insensible—purging still continues—forced him to take two of his pills.

29th.—Last night, having found himself better after the pills, continued to take them till morning, and is now free from headache and numbness, and all excitement of the pulse is gone. To omit medicines, and to take carbonate of iron, one scruple, in the afternoon; had no return of the symptoms.

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I have stated these first cases that occurred to me in detail, to show how completely I was at a loss as to the treatment which ought to be pursued. At length, three people, under my own eye, were attacked, almost at the same hour, with fits, which I could not help recognising as similar to those of which I had seen Syad Khan die. On that day, numbers had also applied to me with nervous pains, headaches, pain in the region of the heart, and nightly sleeping of the hands and feet. Venesection seemed to do harm, as well as all reduction of the system: in the two first cases, loss of blood was followed by fatal attacks. In the third and fifth, when blood had been drawn, the disease was severe. In Mr. R.'s case, quinine, as I administered it, was evidently not to to be depended upon. Purgatives seemed to do no good; and in Rassool's case to do harm. What was then to be done?

I reflected that all the different cases had one thing in common—that during the fit, the arterial system was intensely excited without either feverish skin or hardness of pulse: that this excitement must be purely nervous, for the pulse was at another time as soft and quiet as during the access it was excited and bounding. I therefore determined to trust to assafœtida as an anti-spasmodic during the fits, and to hope something from the power which iron possesses, of counteracting irregular arterial action (especially in the spleen and uterus). I little expected to find these remedies so valuable as they afterwards proved.

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Mesmedee Hassan Jelowdar had complained for some days of rheumatism of the knee and shoulder; was treated with colchicum and Dover's powder, without benefit; had then pain in the region of the heart, shoulder-blade and left arm; action of the heart much excited. Pulse about 90. Could detect no peculiar sounds in the heart, but as a measure of precaution against pericarditis, he was bled and put upon calomel and opium.

26th January, the pain in the region of the heart, the scapula and arm, and in the knee, is more severe; his pulse is not like that of pericarditis, nor are the other symptoms—no fever—complains also of sleeping and insensibility of one side at a certain hour of the night.

27th.—To omit the pills and to take calomel gr. v at night. Pulv. jalap co. in the morning.

28th.—Has not been freely purged. Complains of increased pain in the left breast and shoulder, and the numbness of the hands and feet more constant and annoying. Countenance anxious. To take ferri carb. gr. x scammonii gr. v statim et ferri carb. ℈j vespere.

29th.—Bowels freely opened and the numbness ceased—no return of that at night, but still pain in the breast, and excited action of heart considerable. After a few more doses of iron this gradually subsided, as well as the pains in the knee and shoulder.

Saduck Khan, æt. about 28, a very powerful man, a wrestler, subject of late to attacks of ague, quartan, tertian, and quotidian, on which quinine has had

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little or no effect. Has complained of the leg and arm going to sleep for several successive nights, and has spasms of the thumbs. To take calomel gr. v for three successive nights.

27th January.—Mouth touched by mercury—ague gone, and numbness of the leg and arm has ceased.

28th.—Has again had numbness of the arm and leg. To take two scruple doses of carbonate of iron. After this he had no return of his symptoms.

29th January.—A woman about the age of thirty, who had some days ago taken ʒviij of castor oil, instead of as many drachms, was weakened by purging, but was regaining her strength. Is said to-day to have had three successive fits of fainting. She has pain and numbness of both arms, like paralysis, but has no tingling sensation. Pulse rather weak. Ordered ferri carb. ℈j stat. et repetatur vespere. If she has a return of the fit, to have an enema of ʒij of assafœtida. Had no return of the fit, and the numbness ceased soon after the first dose of iron.

Kutchuk Khan, nicknamed the little, from his enormous size and corpulency, having fallen into a fit, with convulsions and insensibility, his people became alarmed, and sent to me for medicine, and at the same time to the chief physician, or Hakim Bashee, to come quickly, as he was dying. Being from home, my apothecary gave them a dose of iron, which was administered immediately. In about an hour, when the Hakim Bashee arrived, and found his patient conversing merrily with his friends, he was excessively indignant at having been sent for on a

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fool's errand; for they having with sufficient accuracy described a severe attack of apoplexy, while he found the man in apparently perfect health, nothing could persuade him that they were not what is called here, laughing at his beard.

M. T———, a French cavalry officer, of florid complexion, having, about the time when this complaint first made its appearance, what were thought to be threatenings of apoplexy, was bled by the advice of the medical officer to the Russian mission. After this, he had a very severe fit, remaining many hours insensible; his servants continued assiduous in rubbing him, and he came to himself. He was again bled. Every night he had sensations of numbness of the leg and arm of one side, and twice again had fits, but less severe. He had suffered thus for 8 or 10 days, when he consulted me: I gave him two scruple doses of carbonate of iron; the first with 6 grains of scammony to be taken at noon, the other in the evening. That night he had no return of the numbness, nor did he experience it afterwards.

A few other cases of fits occurred, but having now lost their interest, I preserved no notes of them. A great number of people however, I may say almost the mass of the population in this immediate vicinity, were affected for some nights with sleeping of the leg or arm of one side. I experienced it myself, and found the sensation and the unnatural excitement of the heart extremely unpleasant; but it ceased after taking a dose of iron.

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I found on inquiry, that at this time the complaint was confined to a narrow line of this and the neighbouring district. For some days, I saw and heard no more of it, till perhaps a week afterwards, when I was at the furthest extremity of the town visiting an hysterical patient who had symptoms of the same disorder. I was called to see Mirza Saleh, who had been discovered lying in his own room, insensible. When I arrived, he was beginning slowly to recover his senses, and could be roused a little: but as he continued drowsy and stupid, I ordered him an enema of ʒii of assafœtida, and left him for a while. As no one had seen him at the commencement of the attack, I could not learn whether he had been seized with spasms or not. On my return two hours afterwards, I found him talking of his grievances in English with the Hakim Mirza Baba, in a very excited manner. I recommended him to take two doses of iron, and he had no return of his symptoms.

It was not till the 25th of February, and in another distant quarter of the town, that I saw another case of this complaint. On the evening of that day, on coming home, I found a note from Dr. Kapherr of the Russian mission, begging me to come without delay to see M. B———, a French officer, commandant of a detachment in the service of the Shah. The commandant is a man of very quiet habits, aged about forty-five. Head rather large and neck short. I found him on my arrival

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in a state of insensibility, the mouth drawn to the left side, and that side of the body paralytic. He had been in this state about six hours, but little account of his state previous to the attack could be collected from his servants. The pulse was rapidly sinking and nervous—now quick and irritable, now soft, weak and scarcely perceptible. A few teaspoonsfuls of æther. sulph. co. were given, and some 5 or 6 ounces of blood drawn from the arm, after which the pulse became steady. He now had an enema of ʒij of assafœtida, which was retained—and he continued in the same insensible paralytic state till 2 a.m., having been comatose for about fifteen hours. He then awoke as from a sleep, and walked to stool. In the morning I found him perfectly sensible, and nothing remaining of the paralysis but a sense of weariness in the limbs. He then took ol. ricini ʒifs, and had no return of his complaint. According to his own account, early in the morning he had been seized with the most urgent desire to make water, but found himself unable to do so—he continued to make frequent attempts in vain, and the agony of the urgency he describes as insufferable, until he lost his consciousness (apparently about 11 a.m.). When the injection operated, the water came without difficulty. He had no subsequent headache, nor any premonitory symptoms, such as sleeping of the hands or feet.

At another time, I should have considered this an attack of apoplexy, which from his appearance

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one would esteem very probable. But taken along with the previous cases, and considering his general health, both before and after the fit, I think it may, without doubt, be classed with those I have described. This was the last case of this disease which I heard of.

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ON

THE NATURE OF THE

OSSIFICATION OF ENCYSTED TUMOURS.

By JOHN DALRYMPLE, Esq.,

SURGEON TO THE LONDON OPHTHALMIC HOSPITAL.

READ JUNE 13TH, 1843.

On the 28th of April I removed a small tumour from beneath the tarsal cartilage of the upper eyelid of a middle-aged man; which, instead of the usual cheesy matter, contained an apparently earthy or bony deposit. This tumour was somewhat larger than a pea, and composed of concentric layers of hard earthy material, and in form was rounded, except at the surface, immediately behind the conjunctiva, where it was somewhat flattened and rough. From its pressure it has caused absorption of the cartilage, and ulceration of the conjunctiva; hence the friction of its rough surface produced much pain, inflamed the conjunctiva scleroticæ, and rendered the upper part of the cornea opaque.

Upon examination by the microscope, the con-

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centric layers of this tumour were found composed entirely of epithelium scales closely agglutinated together: but instead of the usual transparent and thin lamina with its central nucleus, they were thickened and hard, and contained granular earthy molecules, which could be removed by immersion in weak muriatic acid. No amorphous earthy deposit existed around or among the scales, but the whole was composed of this epithelium, opaque, of a light brown colour, with a clear and large central nucleus.

The sebaceous or cheesy matter of encysted tumours, it is well known, consists of desquamated epithelium, somewhat disintegrated and mixed with oily globules; but here the mass may be said to have been ossified epithelium, or, in other words, these cells were filled with granular earthy deposit.

In structures ordinarily denominated ossified, it is probable, no true bone will be found to exist, except in those connected with original bony or cartilaginous tissues.

This case is interesting, in so far as I am unaware of any similar observation in regard to epithelium cells; and it adds one fact to our at present scanty information on the subject of cell secretion.

Mr. Bowman has recorded the great increase of oil globules in the cells of fatty liver; and Mr. Gulliver of biliary matter in the epithelial cells of the same organ affected with jaundice. But in both these instances the morbid condition consisted of an increase of what originally existed in a normal state,

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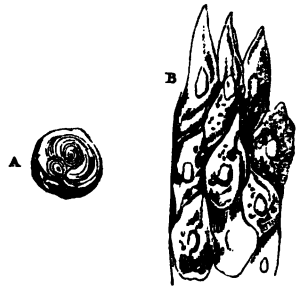
while in the present instance a totally new substance is found, in tissues where *à priori* we should have been most unprepared to expect it.

Mr. Gulliver, who has confirmed these observations, informs me that the earthy material disseminated through the epithelium cells, is principally phosphate of lime, with a trace of carbonate of the same earth.

Fig. 1.—A represents a section of the tumour of its natural size, showing the concentric lamellæ.

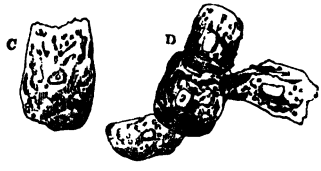
Fig. 1.



B, a portion of one of the lamellæ, magnified about 450 diameters. The epithelial scales of which each layer is composed are here distinctly seen; they are agglutinated to each other, and firmly adherent.

Fig. 2.—C, a single epithelium scale with its nucleus magnified 460 diameters. Instead, however, of the scale being flat and transparent, as in the ordinary state, it is thickened, slightly bi-convex, and contains granules of earthy deposit, phosphate, and a trace of carbonate of lime.

Fig. 2.



D, a cluster of epithelium scales, semi-trans-

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parent, and showing thin nuclei, with here and there a nucleolus. These scales are irregular in shape, as they were obtained by pounding a portion of the laminæ, and diffusing the powder in water.

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ON

THE ANATOMICAL CHARACTERS

OF SOME

ADVENTITIOUS STRUCTURES,

BEING AN ATTEMPT TO POINT OUT THE RELATION BETWEEN THE MICROSCOPIC CHARACTERS AND THOSE WHICH ARE DISCERNIBLE BY THE NAKED EYE.

By THOMAS HODGKIN, M.D.

READ JUNE 13TH, 1843.

In the spring of 1829, I had the honour of laying before this Society the result of an inquiry in which I had then been for some years engaged, respecting the anatomical characters of a large and important group of adventitious structures. From that period to the present time, I have not ceased to embrace the opportunities which presented themselves, for continuing the same kind of research.

As I have already published some of the results which I have obtained, in my lectures on the morbid anatomy of the serous and mucous membranes, it is not my intention to trespass on the Society by a repetition of the details which may be found there.

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My object, on the present occasion, is rather to endeavour to demonstrate the relation which some of the phenomena connected with these structures, which have been pointed out by able and distinguished observers, bear to those which have been noticed and described by myself, and to show that whilst our observations have been in some respects dissimilar in their kind, they are not, in their general results, to be regarded as clashing, or mutually opposed to each other, but that having been directed to different parts of the subject, they require to be united in order to render it complete.

In the course of this attempt, I shall, however, take the opportunity to reply to some objections which have been urged against my previous statements, and to record some further facts which have fallen under my observation.

My former communication merely claimed to be the announcement of the anatomical character of some of the structures referred to; the main object being to show their assumption of the type of compound serous cysts, the modifications of which I described as a preliminary step. I endeavoured to show, that whilst possessing this type, variously modified by the forms of the cysts, and the relative proportion of the solid to the fluid parts, there likewise existed great and important differences dependent on the material by which this form or type may be assumed, and the character and degree of vascular organisation which it receives. At that period, the very curious and important researches

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regarding the function and development of nucleated cells had either not been made, or were generally unknown in this country; and microscopic inquiry, not being necessary to that part of the subject with which I was engaged, had not been undertaken by myself.

Shortly after, that learned and well-practised pathologist, Dr. Carswell, then Professor at the London University College, published, with illustrated plates, his views regarding the production of carcimonia, in which he subscribed his adhesion to that group of pathologists who refer the production of the adventitious structures in question to an error in the blood or lymph, and he adduced some remarkable instances in which a material, resembling that of the adventitious structure, was discovered in the interior of vessels. According to this view, as employed by the Professor to explain the formation of adventitious structures, the necessity for cysts, whether simple or compound, is dispensed with; and he employs an argument against their agency in the production, which makes it evident that my view has not been clearly understood. On this point he is followed by the learned Professor Grose, of the United States.

Perhaps the most laborious and longest sustained inquiry connected with this subject, has been that of my friend Francis Kiernan, whose practised eye and delicate manipulation must attach the greatest value to his researches. Their results have not yet been made public, but it is well known that they are

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much admired by those to whom they have been communicated; and it is generally understood that they relate mainly to the mode of organisation, and the condition of the vessels belonging to the structures in question. I may therefore conclude, that they do not necessarily confirm or invalidate those observations to which my inquiry had led, though I conceive that, in many instances, they ought to facilitate its illustration.

In the autumn of 1838, I paid a transient visit to Berlin, where I had the pleasure of receiving from Professor Schwann a demonstration of the nucleated cells, pointed out by himself and Schleiden as performing an important and essential part in the formation of vegetable and animal tissues. I procured, at the same time, the important work of Professor Müller on the structure of cancer and other adventitious structures, which had then very recently appeared. I likewise inspected the preparations in the museum of the university, relating to this subject, which had been made by Müller himself, but, in the absence of the Professor, they contributed little to the explanation of his views, and presented nothing in refutation of my own. In this respect I laboured under a disadvantage, similar to that which Professor Müller himself experienced when visiting the collection at Guy's, when I had not the satisfaction of accompanying him.

The group of structures with which we are engaged, differs so widely from those which belong to the body in its healthy state, as to have obtained the distinction

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of heterologue. Microscopic examination affords us the means of becoming acquainted with the most intimate structural peculiarities, and is therefore the counterpart of chemical analysis, which relates to the elements which enter into their composition.

The characters thus brought to light, which Professor Müller was, I believe, the first to point out, have very naturally arrested the attention of inquirers, from their intrinsic importance, and from the high authority of the Professor who noticed them. The most practised eyes, and the best instruments, have been employed in these observations, and the results obtained have been so generally in accordance, that, notwithstanding the doubts which are attached by some to microscopic inquiries, they may be received with confidence, although from the optical characters of the objects themselves, their examination is often difficult.

I may observe, that I have not only been on the alert to obtain specimens, but have been anxious to examine them in their most recent state, in order to avoid the changes which may be induced by decomposition, or by the influence of antiseptics employed to counteract it. I have likewise been desirous of having the concurrent testimony of other eyes beside my own; and my thanks are especially due to my friends, John Dalrymple, George Gulliver, Alexander Nasmyth, William Bowman, and Dr. Barry, who have favoured me in this respect, and whose excellent instruments have been employed as well as my own.

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The objects which arrest attention, when a portion of one of these structures is placed in the field of the microscope, and sufficiently extended to admit of examination with a very high power, as for example, with an object-glass of the eighth of an inch focal distance, are,

1st. Nucleated cells of various shapes and sizes.

2ndly. A substance having a filamentous character.

3rdly. Granular matter without definite shape, the particles of which are often smaller than those of the nucleated cells, but by combination forming masses of comparatively large size.

4thly. Very minute spherical particles resembling fat globules, and also much disposed to aggregation.

5thly. Crystals, having for the most part a rhomboidal character, and often forming mackles.

6thly, and lastly. A transparent fluid, in which these objects are contained, and which is made evident by the motion which it permits to take place between them.

These several objects, which will be better understood by reference to the Plate at the end of the volume, are not equally constant in their presence, or in the proportion in which they occur when they do exist.

I shall proceed to notice each of them separately.

1st. *The Nucleated Cells.*—These, from the constancy of their presence, as well as from the great

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importance which is now generally attached to them, will, very properly, claim our first attention.

In some specimens they are so numerous and so distinct, as to appear to constitute the greater part of what is placed under the microscope, whilst in others they are so rare and indistinct, that with some difficulty we detect a cell or two amidst abundance of filamentous or amorphous granular matter. In shape, these objects differ no less remarkably. Sometimes they are nearly or quite circular, with a well-defined circular nucleus near the centre. Often they are somewhat oval, and so regular in their shape, as to bear a striking resemblance to the blood-corpuscles of some reptiles.

The oval figure is more often irregularly modified, and the nucleus, instead of occupying a central position, is near the side. It is not rare to find two or more nuclei, but a single nucleus is much more common. The cells appear to be flattened like blood-corpuscles, and, like them, to be transparent and pliant. These cells often assume so elongated a shape, as to present a caudate appearance when the prolongation takes place in one direction, which it seems to do by alteration in the situation of the substance surrounding the nucleus. Frequently prolongation takes place from both ends of the ellipsis, and sometimes at one or both extremities these prolongations are bifid. We meet with these several forms in the cells, in the different varieties of disease included in the group of adventitious structures under consideration, and appa-

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rently without any necessary connection with such variety. Thus we may find them most distinctly circular in specimens of cerebriform cancer, and also in those of true schirrus. It has been supposed that the caudate and other elongated forms depend on the transformation of nucleated cells into a true tissue.

In respect to size, the nucleated cells differ very considerably. This difference is not only found between the cells of one specimen and those of another, but the range may be almost equally great in those of the same specimen, some being less than those of a particle of human blood, and others having more than three or four times their diameter. Not having employed actual measurement, I am unable to state the extremes of dimension.

The nuclei also differ in respect both of actual and relative size, being, in extreme cases, almost as large as a human blood-corpuscle, and in other examples scarcely larger than the particles into which these corpuscles appear to be breaking up when they become "*framboisés.*"

There is also considerable difference in the brightness and distinctness of the nucleus. It is sometimes well defined and of a clear white. The margin of the cell sometimes presents a similar character, which may, in degree, depend on the application of light; though I think that the state of the object itself has much to do with it.

There is sometimes the appearance of a nucleolus within the nucleus, and besides one or more distinct

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nuclei, the cell itself may also appear to be made up of minute granular matter. Although these cells bear considerable resemblance, especially when well defined, and of a tolerably uniform size, to the large blood-corpuscles of a reptile, they seem to be of a much more permanent character than the particles of blood, since they remain not only a considerable time unchanged in their proper fluid, but bear, with little or no alteration, the addition of water or weak spirit.

2nd. *Filamentous Substance.*—The next material which claims our attention is the filamentous substance.

It is not nearly so constantly present as either of the cells just spoken of, or the granular matter to be hereafter described. It is from its apparent importance and characteristic appearance that I next take it up. It seems to have given the name to one form of the structures in question, which Müller has described as *carcinoma fasciculatum seu desmoideum.*

Whilst in some specimens we discover little or no trace of this substance, especially when the object is taken from the soft contents of a distinct cyst, it appears in other examples to constitute the major part, though taken from a similar situation:—on which I lay some stress for a reason which will afterwards be apparent.

Sometimes the fibrous character is distinct and well defined, nearly resembling that of perfect cellular membrane; but in others it is much more obscure,

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more nearly resembling the appearance presented by the fibrine of recently-coagulated blood, in which there is an indistinct transition from granular matter. Whilst large nucleated cells are very constantly present in those specimens which are of an unquestionably malignant character, and are often very numerous in them, the presence of the filamentous matter, though also occurring in malignant structures, is perhaps in itself an approach to the normal, or at least the permanent tissues, seeing that it is not only found in them, but is most abundant in those specimens in which the malignant character is most equivocal.

The filamentous matter present in the portion under observation may sometimes have formed a part of one of the cysts or membranes which enter into the composition of these tumours: but in other instances, where the liability to such mixture has been carefully avoided by selection from a central part as before hinted, filamentous matter will notwithstanding be discoverable.

Such cases are well adapted to throw light on the question, whether fibres or filaments are of necessity produced by transition from nucleated cells, which, having become elongated or caudate, pass through a succession of similar changes until a mere filament is the result.

The appearances which we may observe in some of these growths, as well as those presented by fibrine from recently-drawn blood, make me strongly inclined to the opinion that fibres are not neces-

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sarily formed by the progressive elongation of perfect cells, but rather from the amorphous matter which accompanies them.

It is satisfactory to me to know that in this opinion I am supported by my friend George Gulliver, who had, independently, arrived at a similar conclusion.

3rd. *Granular Matter.*—The granular or amorphous matter, which I have enumerated as one of the constituents of these tumours, made known to us by the microscope, is constantly present, but in very different proportions. It may, I believe, be correctly said, that it frequently constitutes the major part. From the fact of its form possessing a negative character, it is one of difficult investigation, and though we may change our power, focus and light with the hope of success, the best instruments which our present skilful opticians produce, in the hands of the most practised observers, have not reduced it to a definite figure.

I believe that this matter is regarded by the firm adherents of Schwann and Schleiden, as composed of nucleoli, cytoblasts, '*débris*' of cells, or under some name or other as referrible to their universal type. Of this I do not presume to form an opinion, confessing myself to entertain doubts regarding some of these points. Be its character what it may, the granular matter is no unimportant constituent of the structures now under our consideration.

4th. *Spherical Particles.*—The material which I have mentioned under the designation of minute

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spherical particles is seldom, if ever, absent; but its proportions are very various, and the groups which the aggregation of these spherules produce are not uniform in size or shape. The completely spherical figure, and the great difference of dimension which these little particles exhibit in the same specimen, so completely accord with the character of oil or fat globules, that I cannot hesitate to regard them as such. They may be found, not only in the substance of a tumour, whether of schirrous firmness or of the soft and grumous consistence of cerebriform cancer, but also in the fluid contained in more manifest cysts, in which case, when very numerous, they may impart a slight yellow turbidity. When closely aggregated, either to the number of a dozen, or of hundreds, they generally form an irregular or very imperfectly globular mass, but I have seen them producing a multitude of masses as perfectly spherical as themselves, having some appearance of being contained in a capsule, which, however, did not exist, the semblance being occasioned by the peculiar mode of transmission of light from the margin of the semi-transparent sphere. These aggregations of spherical particles are interesting, not merely on account of their constant presence in the adventitious structures which we are considering, but from their probable connection with the fatty degeneration of normal structures, of which the production of fat liver, as pointed out by Bowman, may serve as an illustration.

5th. *Crystals.*—Crystals, the existence of which

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the microscope has made known, are very frequently, but not constantly present. They generally appear as plates made up of the aggregation of a few rhomboidal crystals. They were discovered by Müller in the discharge occasioned by the breaking up or softening of a cancerous tumour, but they may be found in structures much less advanced. They may be very numerous, or they may be so rare as only to be found by careful search, and after placing different portions in the field of view. Their appearance leads to the supposition that they are composed of some of the inorganic crystallizable fatty matters, into which animal organic substances are found to be converted under certain physical conditions.

On learning that Müller had discovered these crystals, I immediately recognised in this fact a fresh analogy between these adventitious structures and the compound serous cysts which are frequently developed in the ovary or its vicinity, and in which I had seen that cholesterine may form crystallised masses resembling the purest biliary calculi of the same substance. I am, therefore, induced to suppose that these crystals may be derived from the oil or fat globules already mentioned, by a process which, although taking place within the living body, is not of a vital character.

The researches of my friend George Gulliver, who has discovered a similar crystallizable fatty matter in the coats of arteries and in several other situations, have thrown an important light on the subject

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of this mode of degeneration; which will doubtless be found to play an important part in bringing about the gradual but certain deterioration to which time subjects living animals.

6th. *Transparent Fluid.*—With regard to the fluid in which the several forms of production which have now been enumerated are so placed as to allow mutual change of position, it is difficult or impossible to arrive at any experimental results, seeing that what might be collected as a fluid will, on microscopic inspection, be found to contain particles of one or all of the substances before mentioned. It is most probable that it is not merely derived from, but resembles, the *liquor sanguinis*, and yields, like it, elementary constituents for the development of the different structures connected with it.

It will, I have no doubt, be readily admitted, that neither any of the organic forms which have been mentioned, nor the crystals, nor the containing fluid, are so peculiar to the adventitious tissues in which they exist, as to constitute a character by which they may be distinguished from other tissues. Even the nucleated cells, which are the most interesting of these substances, and which are probably the most intimately connected with the development of the adventitious tissues, can scarcely be said to present a distinctive character, seeing that every animal tissue, whether normal or abnormal, is supposed, if not proved, to have its origin in cells of this description.

But it may be urged by some who concede this

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point, that the cells which are concerned in the formation of malignant structures have remarkable and peculiar characters, which distinguish them from those cells which contribute to other formations. Observation in some degree sanctions the truth of such a remark. It is true that these cells are remarkable for their variable and generally large size, but it is also a fact that some of the normal productions also contain cells of a variable and large size; as for example those concerned in the formation of cartilage.

On the other hand, we may find structures of which the malignancy is certain, furnishing cells, little if at all different from those of normal tissues. We also see that cells of a particular character are by no means confined to certain forms of malignant disease. They cannot therefore be referred to for the purpose of distinguishing one form from another.

Chymical analysis cannot at present be regarded as offering a more trustworthy criterion, although we must attach value and importance to those careful researches which have made us acquainted with the principles contained in these productions, and with the proportions in which they exist. We are therefore reduced to the necessity of employing an assemblage of characters to distinguish the malignant from other abnormal growths—a remark which I had occasion to make in my former paper, the truth of which has not been set aside by the valuable contributions which the subject has since received.

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The peculiar anatomical structure, dependent on the production of compound cysts on which I have strongly insisted, is so constantly present, and leads to characters so essential to the correct description of individual specimens, that on these grounds I am disposed to attach much importance to it; as well as on account of the manifest relation which it may be shown to bear to the nucleated cellular origin pointed out by Müller.

Although I may safely state that I have never seen a recent specimen of any of the diseases in question, which I have had a fair opportunity of examining, in which I could doubt the existence of the structure alluded to, and though I find it more or less strongly marked in all the specimens preserved in museums in which structural arrangement remains evident, I cannot ask that my views may be admitted without the production of proof, especially as objections have been raised against them.

I believe that the difficulty of admitting the existence of a cystiform structure has arisen from the inquirer expecting to find, in all cases, a much more conspicuous and tangible evidence of a reflected serous membrane than exists in nature, or than has been stated in my description.

To those who are accustomed to trace the steps of even normal development, it must be familiar that the original type may be very much modified in subsequent stages of growth. This, however, is more particularly true of the adventitious and heterologue

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structures, the formation of which does not appear to tend to any definite term of form or size. It is, therefore, essential to become familiar, not only with the different forms in which the operation of the principle can be clearly demonstrated, but with the modifications which may be subsequently impressed upon them. We should then be able, although the original character be lost, to detect unequivocal vestiges of its existence.

The most frequent, but at the same time the most satisfactorily explicable cause of obscurity, is the production of more or less intimate adhesion between the different membranous surfaces, by which a group of compound serous membranes, having completely the reflected character, may be converted into a solid mass. It would not be more difficult to exhibit the reflected serous membranes in these cases than to teach the reflection of the peritoneum from the abdomen of a subject who has died with universal chronic peritonitis, by which the viscera have been glued together and intermixed with tubercular deposits. Yet as by a section of such a mass we might exhibit the substance of the liver, cut into the stomach, and recognise the condition of its mucous membrane, and distinguish the small from the large intestines when similarly divided, and perceive, and even name, particular vessels, so, in the tumours in question, when the eye has been accustomed to recognise the form assumed in those cases in which doubt does not exist, it will readily recognise those appearances which result from the

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mode of formation, though the separation of particular parts be impracticable.

Evidence of this description may be found upon the surface of a tumour by carefully removing the surrounding cellular and other structures. We perceive a peculiar nodulous character which in the more distinct cases is seen to be produced by the protrusion of subordinate cysts.

When we have recourse to the examination of sections of the interior, appearances may be very much modified by the direction which the incision has taken with reference to the clusters of cysts, but experience will soon familiarise the eye with these differences, which, instead of producing doubt, will then be found truly confirmatory.

In addition to obscurity arising from more or less firm adhesions, we have that which proceeds from the nearly uniform colour and consistence which the new growth thus united may have assumed throughout. Such specimens afford the greatest difficulty to those who, having really recognised the characteristics of these tumours, are seeking for the traces of their existence in obscure cases. I believe that, in most instances, this obscurity would not exist were the section made quickly after death or operation, when we can scarcely fail to discover some satisfactory indication of structure, more especially if sufficient attention have been paid to the exterior in order to direct the course of incision.

Even a very few hours will be sufficient greatly

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to obscure traces which when recent would have been readily admitted. Such obscurity may be produced, or greatly increased, by immersion in alcohol, which coagulates the fluid, and gives opacity to some of the semi-transparent parts which, by their contrast, often display internal arrangement.

When we understand the kind of evidence which may be obtained, and are aware of the causes and modes through which obscurity may be introduced, we shall be much more likely to discover and appreciate those traces which yet remain to be perceived.

It may serve, in some degree, to illustrate the difficulty of the subject, to compare it with that which the commencing mineralogist will sometimes find in examining a compound rock, as, for example, granite or gneiss. He is taught that it consists of quartz, mica, and felspar, and he may be acquainted with the characters of good, well-crystallized, cabinet specimens of these substances; and from the great difference between them and the particles crowded together in the almost amorphous fragments of one of these rocks which he may pick up for examination, he may be ready to doubt the existence of one or more of the minerals which enter into its composition.

Whilst I fully admit the difficulty of the investigation, and the causes just assigned, which render it essential that the inquirer should pass from the conspicuous to the obscure, I cannot omit to mention other sources of difficulty which inquirers have

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created for themselves, by which they have destroyed that of which they were about to proclaim the non-existence. This is strikingly the case when maceration is had recourse to, prior to dissection. Under the influence of this process, soft and tender structures break down, and become blended with each other, and with the fluid, or grumous materials, of which they had, at one time, formed the distinct receptacles. Although the well-defined vascular cysts may thus be converted into an irregular mass of filaments and blood-vessels, such destruction of original structure is not always the consequence of the inquirer's manipulation: it may have been brought about during the life of the patient, by the natural progress of decay to which these structures are liable, and the objector may make, as he conceives, a triumphant denial of the existence of that, the "*débris*" of which he had alone seen.

Now, these very "*débris*," in the form of tassels of filaments and vessels, will, to one who has watched the changes produced by decay, be sufficient evidence of the pre-existence of the structure in question. An illustration of this remark may be found in cases of soft carcinoma of the uterus, in which, from the perishable character of the new growth, it is often difficult to discover cysts in a state of integrity, though this may, at times, be done in the most conclusive manner.

Another source of the difficulty which has been met with, has been taking for examination a part of a tumour, so removed from the mass as not to

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exhibit the whole, or even the part of any principal or subordinate cyst, in which the structure in question could be demonstrated, though, taken in conjunction with the part from which it had been separated, more or less satisfactory evidence might have been obtained.

A similar source of difficulty and failure is encountered by employing a microscope, or even a powerful lens, for the purpose of detecting those appearances which are best seen with a good naked eye, because they require the proper appreciation of neighbouring parts, just as we use the naked eye to learn the constellations, but require a telescope to see the double stars.

No exception to the existence of this type of cysts, in one or other of its forms, having been detected by me, after careful examination, in the whole group of adventitious structures to which I have ascribed it, I could not doubt that it depends on a law of formation common to them all; but I merely offered as speculation that which I regarded as the probable *modus operandi* of such law. When I became acquainted with the theory of nucleated cells, and with the researches of Müller which demonstrated the distinct existence of these bodies in the group of adventitious structures under consideration, it was impossible for me not to inquire how far this fact might go to explain the production of those characters which I had been studying on a larger scale.

It appeared to me, that the adventitious structures having the type of compound serous membranes

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admitted of a much more easy and satisfactory reference to the production of cells than any of the normal tissues which had been studied in their transition from cytoblasts and nucleated cells. In fact, the most perfect specimens of compound serous cysts seemed so completely to resemble a collection of nucleated cells with nucleoli, that I should have been ready to adopt this explanation, and abandon my own conjecture as to the operation of coagulation upon the surface of a plastic fluid, had I not witnessed some striking facts, which were strongly opposed to this application of the cell theory, whilst they were perfectly in accordance with that of coagulation. One of these facts I have already laid before the Society, in my former paper, which it may not be amiss for me to quote from that statement, as it was in existence before the announcement of the cell theory.

"The cysts of which I am speaking contained a substance which may perhaps be best described by comparing it to the crystalline lens when it has been in some degree softened by decomposition, though less uniform than it, both in consistence and appearance. That part which was the nearest to the containing cyst, was the least firm and consistent, but the most transparent. It was too transparent and colourless to conceal the firmer interior part, which was rendered distinguishable by a slight degree of opacity, and appeared to consist of a cluster of small pyriform grains, but nothing like a membrane could be distinguished enclosing them individually, and separating

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them from the transparent matter in which they were placed.

This observation appears to possess a twofold interest. In the first place, it will enable us to conceive how easily the traces of original structure may be lost when we find them impressed on a material so tender, and which is in contact with another material in composition almost identifical with it.

Secondly, we may draw from it a strong presumption that the cysts of which we have been speaking, in the various forms in which they present themselves, are altogether new formations, and not the result of the extension or development of pre-existing structures, and which, therefore, tends to confirm the opinion which I have already advocated, that they are neither the dilated terminations of the extreme branches of any of the three vascular systems, nor modifications of the cells of the cellular membrane."*

Another of the facts to which I allude, and which is, to my mind, the most conclusive that has occurred to me, was also seen and recorded, before I was aware of the interesting researches of the German microscopists.

In the eleventh month (November), 1836, I inspected the body of a lady—a patient of Dr. Ashwell—who died after long suffering, from the largest tumour which I have ever seen developed in the parietes of the uterus. In the progress of the dis-

* Med. Chir. Trans., vol. xv. part 2, p. 306.

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ease, malignant tubercles had been developed in the sub-serous cellular membrane of the abdomen, and it was upon the smooth internal surface of the peritoneum that the appearances to which I allude were seen, not only by myself, but by Dr. Ashwell, Dr. Ridge, and some other medical men, to whom I pointed them out.

I transcribe the account of them from my report of the inspection, published as a part of the case by Dr. Ashwell, in the Guy's Hospital Reports, No. IV.

" On separating the recently-adhering parietes, it was evident that the material interposed between the two surfaces of peritoneum was not ordinary coagulable lymph, but a soft white cerebriform matter, somewhat like stationers' paste, intermixed with spots of extravasated blood of various sizes. On carefully separating further portions of the attached peritoneal surfaces, it became evident that the soft cerebriform matter was not irregularly effused upon the inflamed surface of the peritoneum, but that it was collected into circumscribed depositions of very various sizes, but having almost universally a rounded but very compressed form, the flatness evidently depending upon compression between the two opposed surfaces of serous membrane. The circumscribed rounded figure seemed to depend on the cerebriform matter not blending with the general secretion of the peritoneum, but rather remaining as a drop of oil would do upon a wetted surface. It likewise appeared that on the surface there was an

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extremely tender pellicle, which rendered it possible to move the soft deposits without breaking them, although their form might be changed.

"A very slight force, however, produced rupture; when the contained material escaped as a grumous amorphous mass. They might, in fact, be compared to little yolks of egg separated from the white, except that their form was more flattened, and the enclosing pellicle comparatively more tender. These little collections of cerebriform matter possessed different degrees of translucence. Some presented an uniform milkiness: others were spotted with points of extravasated blood; and in some the spot of extravasated blood formed a defined rounded body, which appeared just as distinct from the white cerebriform matter as they did from the surrounding texture or secretion.

"These appearances were most beautifully seen on the omentum, which was thin and delicate, and, with the exception of these appearances and the old adhesions before mentioned, retained a perfectly healthy character. On the omentum, some of these little circumscribed deposits of cerebriform matter might be seen scarcely so large as pins' heads, whilst others were nearly as large as a shilling."

As it is unphilosophical and consequently unsatisfactory, to admit two causes for the production of a phenomenon, when one will suffice, I was rather staggered by the apparent necessity to admit the two principles which I have here referred to; the cell theory being strengthened by the accession

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of the best physiologists and observers adducing phenomena, some of which I had myself witnessed, and that which I may term the coagulation principle, having the support of, at least, equally strong evidence. Practically there seemed to be a link wanting to connect the large nucleated cells exhibited by the microscope with the most minute yet perfect compound cysts, which the unassisted eye may perceive; as, for example, in the neighbourhood of some breast tumours. In theory, we could easily conceive one of these large cells surpassing its fellows, and becoming persistent as a serous cyst, producing others in its parietes by the development of its nucleoli; but multiplied and careful examination has not, that I am aware of, ever detected one of these large cells surpassing the rank of a microscopic object possessing, at the utmost, about four or five times the diameter of a blood corpuscle. I had repeatedly seen the cells of cancerous tumours, and other productions of the same family, and been satisfied of their existence under the different forms which I have mentioned, but without being enabled to overcome the difficulty which I have stated, when careful attention to the phenomena presented by cells pointed out by my friend Dr. Barry, in his account of the early development of the mammiferous ovum, appeared to furnish the desired solution, and not merely to combine the two modes of formation to which I have alluded, but to throw light on other parts of

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the subject, of considerable interest and importance in a practical point of view.

In the development of the ovum, the production of nucleated cells appears to perform the double purpose of preparing organisable matter, hyaline, by a process of assimilation, and of giving origin to important parts by superior development, which, in this state, exert an important influence on the surrounding materials derived from other cells, inducing the coalescence of the hyaline which they have furnished. That which struck me as the best illustration of this process will be found in Dr. Barry's Third Series on Embryology, in the Philosophical Transactions.

It will be seen from this, that only a small number of the nucleated cells carry out their own development, but that the majority are the preparers and contributors of the pabulum of the new growth. Now the coalescence of the particles of hyaline, whether somewhat retaining the form of cells, or more completely broken up, appears to take place precisely in such a manner as to produce the external coagulation, on which, from observation, independently of any theory, I have been induced to insist.

Hence it becomes extremely probable, that some of the more considerably enlarged cells, which are observed in the microscopic examination of the matters of these adventitious growths, become the means of determining the coalescence around them,

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of the hyaline furnished by other cells, and thus account for the great tendency to the production of cysts having the compound character, as well as that of reflected membranes.

This disposal of the materials thus supplied by the hyaline of other cells, which, in breaking up, prepare the way for other nuclei to go through the same stages, not only accounts for the material of which these adventitious growths are composed, differing in infinite degrees from the plastic material employed in healthy structures, but also for the extraordinary rapidity with which the growth of some of these structures is effected. Thus, in a case which recently fell under my observation, but a few weeks elapsed from the period at which careful examination could detect nothing abnormal in a very spare and emaciated subject, to that at which a large nodulous mass could be seen as well as felt projecting in the epigastric region. The death of the patient, which soon after followed, showed that this tumour was occasioned by the growth of fungoid or cerebriform tubercles in the liver, more than one of which was as large as a good sized orange. There were numerous other tubercles intermediate between these and the smallest observed, which might be as large as a grain of hemp. Though a marked difference of consistence was observable in the material composing the different tubercles, and even in different parts of the same mass where the tumour was large, there was a striking resemblance

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in the microscopic characters of the cells taken from the different parts which were examined. Nucleated cells of considerable size, and remarkably distinct, existed in extraordinary abundance, which seemed satisfactorily to account for the rapid growth which had taken place in this instance.

With this view of the subject, it is not surprising, that under the field of the microscope, a small portion of soft matter taken from a malignant structure should often suggest a striking resemblance to the blood of some of the inferior animals, seeing that this compound of nucleated cells, granular matter, and fluid, has to perform the part, in the adventitious structures, which the blood itself does in the growth of the ordinary structures.

This view, which I believe to be in strict accordance with the best observed facts, stands decidedly opposed to the theory, that the peculiar matter of cancer and other allied diseases exists as such, ready formed in the blood, from which it is eliminated at those parts at which the tumours are formed. Were the blood so contaminated, the continued healthy nutrition of the body at large could not proceed as it often does, and healthy cicatrices, after wounds and operations, would not be formed, as is frequently the case. At the same time, I would by no means deny the possibility, or even probability, that some of the nucleated cells may find their way into the blood, and be arrested at particular parts, giving rise to productions similar to the original tumour, more

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especially when the latter has advanced to the softening stage, and the lymphatic glands have become affected.

The frequency with which the first carcinomatous or other adventitious production, with which the patient is affected, may be satisfactorily traced to some local injury, would seem to show that these cells may be developed *de novo*, and consequently that their transport, though probable, is not absolutely necessary. The superior tendency which particular textures, and even particular parts of textures, exhibit to the production of these structures, when the system has become effected, is more worthy of remark, than easy of explanation. I could adduce some striking illustrations, but I will not extend this paper by details of cases, which the Society will probably be willing to receive on a future occasion.

With regard to that interesting part of the subject which relates to the vascular organization of these adventitious structures, I feel that anything which I could offer would be imperfect, and of doubtful authority, so long as the researches of Francis Kiernan in relation to it remain undisclosed.

I think, however, that it may be safely concluded from such observations as the naked eye will occasionally enable us to make, that there must be some analogy between the production of vessels in these structures, and their formation in cellular pleuritic adhesions, and other comparatively normal adventitious structures, and I confess that my present

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opinion accords with that of Lippi, in regarding the new vessels in new parts as the prolongations of the vessels of contiguous older parts, and that there is not a production of independent vessels which subsequently inosculate with those in their vicinity.

To me, it appears most satisfactory to refer the formation of vessels to coagulation taking place at the surface of the blood, which thus no sooner forms a stream than it acquires the conduit, or vessel, in which it is to be contained: a theory which will, I believe, satisfactorily account for the production of the three systems of vessels, the venous, the arterial, and the lymphatic, as I some years ago suggested in the medical section of the British Association, at its meeting in Bristol. If this view be correct, the vessels in a fungoid, or other adventitious structure of the class we are considering, being essentially derived from the more healthy coagulable matter of the blood of the body generally, and if in any degree only partially and at the exterior, receiving the material of their growth from the morbid hyaline of the new structure, we may easily understand why these vessels should to a certain extent possess their normal characters, although such vessels are often remarkably weak from the imperfect character of the part through which they ramify. It cannot be doubted, that the blood supplied by these vessels to the adventitious structure, furnishes the materials for its continued growth; and, in accordance with this, we may often find the vessels of a very large size, where the growth of the tumour has been great

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and rapid. That a large part of such growth consists in the successive production of the abnormal nucleated cells, described in the preceding part of this paper, seems to be extremely probable. Yet I am led to believe, that it is not the whole of the materials which the blood may supply to the tumour, which is so disposed of, but that comparatively healthy blood being sent to the new growth, it may retain sufficient of its normal characters to produce more or less analogous tissues, which in different proportions may be almost invariably found pervading the mass,—as, for example, where well-formed cysts are produced, and adhesions of loose or condensed cellular membrane are established.

It seems to be perfectly in accordance with this, that the nearest approach to a normal tissue is found in the membranous cysts, and their immediate vicinity, which membranes not unfrequently form the bed in which the vessels ramify.

Although I have, in accordance with the phraseology which usage has sanctioned, employed the term nucleated cells in speaking of those corpuscles which present one or more brightish spots within their circumference, and have a circular, or more or less elongated figure, I confess I have some hesitation in completely admitting the cellular character, as neither when these are entire, nor in their breaking up, do they seem to exhibit any defined capsule or membrane. The appearance which seems the most strongly to sanction the idea of a cell, is that of one nucleated corpuscle containing one or more

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within it; but even this, which is comparatively rare, is by no means conclusive. It would seem, that as these bodies are formed from the blood, and exhibit themselves in the first step towards consistence or coagulation, something less determinate than a sac of skin or membrane would be produced. The kind of consistence which suggests itself to my mind when viewing these corpuscles, as well as those of the blood, is that of a substance soft throughout, rather than that of a fluid contained in a vesicle. Where a distinct nucleus exists, such corpuscles might be compared to the ova of frogs in their mucoid envelope, or to certain seeds, as, for example, those of garden cress, which after maceration in water become surrounded with a more or less consistent viscid substance.

This view seems quite accordant with their function of producing plastic matter, or hyaline, by the assimilation of principles dissolved in the *liquor sanguinis*, or other fluid, in which they are placed.

Such corpuscles would contribute to the building up of structures by yielding the material of which they are composed, so as to form a homogeneous mass, which is more consistent with the cohesion as well as microscopic characters of the tissues, than that of the employment of cells in their individual character, like bricks in the construction of a wall. At the same time it must be fully admitted that there are some structures in which the nucleated particles to a great degree retain their character. The epithelium seems to be the most striking exam-

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ple of this kind, but such exceptions seem rather to confirm the rule than to set it aside, since in the disintegration of epithelium, we obtain the scattered fragments in the form of nucleated particles, which seems to indicate that a perfectly new structure had not been formed. In such instances the nucleated particle appears individually to have acquired a more complete development, and at the same time to have been rendered unfit to be worked up in the composition of a new living tissue. The individual particle has advanced a step further in those cases in which it becomes furnished with cilia. The same principle is seen in hair, nails, feathers, &c., of which there is no absorption.

I am aware that it may be objected to the opinion which I have offered, that by the addition of certain re-agents something like the existence of an enclosing pellicle may be demonstrated, but such a pellicle may easily be formed by the process employed, or even spontaneously in some cases in which the existence of the corpuscle is protracted by a mere act of superficial coagulation, and in this way a true nucleated cell containing other corpuscles may be produced. Some of the nucleated corpuscles discoverable in adventitious structures, the blood corpuscles of the proteus, and some transformations of cells in the advancing ovum, may come under this description, without invalidating the opinion which I entertain, or confirming that which I feel a difficulty in adopting.

There can be no doubt that great and important

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light is to be thrown on the characters and formation of this class of adventitious structures, as well as upon the normal tissues, by the aid of animal chemistry, and I would be one of the last to depreciate any accessions to our knowledge from this quarter; but up to the present time, whilst distinct characters may be satisfactorily made out with respect to form, as seen with the naked eye, or discoverable only with the microscope, chemical analysis does not furnish us with any sufficiently strongly-marked distinctive characters to constitute the boundaries of a class, though they may indicate varieties of great practical importance, of which some of the varieties established by Müller may be adduced as illustrations. A great obstacle to our deriving a satisfactory test from chemical analysis arises from the progressive changes which both solids and fluids undergo in the course of their production, and also when produced. We may be satisfied of this *à priori*, when we consider that the embryo commences in what appears to be a single cell, which produces others, in their turn, to become producers, in almost infinite series, and that springing from this single point a great variety of structures, differing chemically as well as mechanically, are produced. Again, if we examine the subject *à posteriori*, and take a part which has acquired something like the form which it is to retain through life, and subject it to chemical analysis at different ages, we shall find important differences between the fœtal and the adult composition. Similar

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changes take place in the adventitious structures, both as regards the successive development of parts and the changes effected in such a structure, or even in parts of it when produced.

I have elsewhere had occasion to notice that from a tumour having all the closeness and firmness of schirrus, a new growth may proceed, having the softness and rapid increase of fungoid disease. The most distinct specimens of compound adventitious serous cysts which form the type of this group of structures, which in their appearance so closely resemble the normal tissues that they cannot be regarded as malignant, and which from their want of influence on surrounding parts, and on the system generally, justify their benign character, will sometimes give origin to a fresh growth on some part of the tumour which they constitute, presenting all the characters of a truly malignant adventitious structure. We often find melanosis combined with another variety of the same class, and when, as is sometimes the case, a succession of operations are performed at the same part for the extirpation of the tumour, there is a progressive alteration in the physical as well as chemical characters of the adventitious structure, which is constant only in exhibiting the type of compound serous cysts upon which I have so long insisted.

It will, I hope, be generally understood that these remarks are not designed to underrate or discourage any extent of chemical investigation which may be devoted to the subject, but merely to point

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out the objections to which it is liable when in its present state it is appealed to as a distinctive test, except as between varieties.

Dr. Carswell has urged an objection against development through the production of compound serous cysts, as pointed out by myself, which is adopted by his successor, as well as by Professor Grose, of Cincinnati, who regards it as triumphant. An objection sanctioned by such authorities is too important to be allowed to pass without consideration, either to be received as a correction, or to be refuted if invalid. The Professor observes that there is an ambiguity as to whether the cysts produce their contents or are produced by them, and that in the latter case their importance is overrated, and that the adoption of the reflected serous membrane as a type, attributes to the adventitious structure a position which in fact is exterior to the investing membrane, precisely as the heart is not literally inclosed in the pericardium.

I shall notice the latter objection first, as being of the more tangible character, and preparing the way to the better understanding of the former.

For the comprehension of this, as well as of almost every question connected with the subject in which anatomical character is concerned, I would appeal to the ovarian cysts, which are not only examples on a large scale, but much less liable to obscurity through alterations produced by successive change.

Let us commence with a large containing sac.

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This has, like other parts within the abdomen, an extensive covering of peritoneum: in fact, it has its close and reflected portions, and this very membrane may serve as an illustration of the Doctor's objection, seeing that this membrane is wanting as a covering at the more or less extensive base of attachment of the tumour.

The peritoneum is the accessary, and not the essential part of the tumour. This we may find, as to bulk, chiefly to consist of the peculiar fluids which may be withdrawn by the trochar, and which we find everywhere enclosed by the lining membrane, which forms a perfectly continuous closed sac. The fluid in the sac is therefore partly enclosed by the peritoneum, as the blood in the heart is by the pericardium, but it is perfectly enclosed by the sac, as the blood is by the lining membrane of the heart prolonged into the large arteries and veins and their ramifications.

Let us now consider the second order of cysts that arise in the parietes of the principal one. Each of these commences as a perfectly closed spheroidal sac beneath the lining membrane of the principal one. In the progress of its development it pushes forward the lining membrane of the original sac, beneath which it is formed, and consequently has from this source a close and reflected covering, though these may be widely separated from each other by the copious contents of the first sac, but the broad base or attachment may be so extensive that the very character

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of a reflected membrane may, with difficulty, be recognised, or it may be so slender, and the secondary growth so filamentous, that the existence of the second sac may be rather inferred than demonstrated. Sometimes, as I have also shown, in the second sac, in the progress of its development, an opening may be produced through its own membrane and that which invests it, producing a communication between the first and the second, which latter pours its secretion into the larger cavity, and thus becomes a true follicle, probably illustrative of the cellular origin of other follicles. It is needless that I should describe the succession of sacs which not in theory only, but in fact continue to be developed in this mode. Enough I think has been stated to show that on the principle of the formation of reflected membranes, the peculiar matter of the tumour, whether fluid or solid, is not left partially uncovered by membrane. In considering the reflected character, we must not lose sight of the lining membrane, and in considering the tendency to more or less rapid development, we must not lose sight of the subordinate cysts, the development of which produces the reflected form in the membrane, in the parietes of which it has been produced, which reflected character forms an important part in producing the anatomical characters of the mass.

With respect to the other part of the objection, viz., that it is not shown whether the sacs or their contents are first produced, and that it is con-

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sequently uncertain which is cause and which effect, I may, perhaps, be allowed to observe that I may be content to leave this point in the same situation with others to which it is most intimately allied, I mean all those productions to which a cellular origin is conceded.

Of this description are the pulps of the teeth, which in many respects bear a close analogy to the compound serous cysts observed in the production of the adventitious structures. Whilst yet of microscopic size, we find both cysts and their contents; and in their advance to their ultimate condition, both pursue their changes in mutual dependence on each other.

The membrane, however, in both cases seems to be the more important, seeing that it is, in both, the medium of nutrition, and also in some degree the determiner of form.

I have elsewhere stated that in the neighbourhood of a malignant or cancerous growth, the tendency to contamination of the surrounding structures appeared to be determined by the occurrence of inflammation in these textures—an idea that has been opposed as an hypothesis devoid of proof. The remark originated in the observation of facts, and for its explanation I have merely conjecture to offer. The fact however is of such uniform occurrence, that I have no hesitation in appealing to my most experienced professional brethren for its confirmation, and I think they will unite with me in regard-

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ing it as of great importance with regard to the result of operation.

When the adventitious structure is of considerable size, and has been of long standing, we shall find the surrounding structures perfectly healthy, or a little condensed, provided no inflammation has been excited. On the other hand, where inflammation has been known to exist, either repeatedly or obstinately, the neighbouring textures are frequently, though not invariably, affected with the disease in what has been termed the infiltrated form.

It is also probably to be ascribed to the occurrence of neighbouring inflammation, that a material having, in some respects, the character of a malignant growth has occasionally been found in the vessels leading to or proceeding from a malignant tumour.

Instances of this kind have been adduced in favour of the theory that malignant disease commences by the production of an abnormal principle in the blood, an idea which appears to me equally untenable in theory and in fact.

We see wounds heal with perfect facility and in the healthiest manner in persons labouring under malignant disease, provided the part in which they are situated be exempt from the disease; a fact which seems to be irreconcileable with the supposition that cancerous matter is circulating in the blood in quantities sufficient to occasion the obstruction of vessels of considerable size. When we find in connection with parts suffering from inflammation of different

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kinds, the arteries, veins and absorbents, somewhat similarly affected, in which examples we cannot doubt the influence of local disease, there does not appear to be any necessity to reject a similar influence in cases of malignant disease, in order to resort to another more improbable and more difficult of proof.

It may not be amiss for me now briefly to state the conclusions which I wish to be drawn from the observations contained in this paper.

1st.—That continued observation has confirmed the constant presence of the type of compound serous cysts in a class of adventitious structures, which comprehends the whole family of cancerous diseases. I may add, that I have found it, not only in man, but also in the inferior animals, as, for example, the horse, the ox, the cat, and different species of birds.

Several practised observers have fully confirmed my conclusions, and I may here be allowed to record that the late Professor Delpech, and the present Professor Rokitanski, have personally informed me that they had independently been led to take similar views.

2ndly.—That the microscopic examination of these tissues, though extremely interesting, does not furnish perfectly conclusive tests of any particular form of adventitious structure to which a specimen may belong, but that it demonstrates the application of the nucleated cell theory, whilst it is fatal to that of cancerous matter being formed in the blood, and

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eliminated at the spots at which the tumours become manifest. It therefore furnishes an important argument in favour of operation, though other practical considerations require to be attended to, before operation is decided on.

3rdly.—That to have a complete view of the mode of production of these structures, we must combine the cell theory of Schwann and Müller, the coagulation principle which I had previously suggested, and the process of organization investigated by Kiernan—three stages of development which appear to occur in the order in which they have been enumerated, and that none of the phenomena, taken singly, is an adequate test of malignancy, which, as stated in my first paper, must be regarded as the sum of several characters.

4thly.—That chemical analysis, though extremely important and interesting, affords an imperfect and inadequate criterion; as the principles concerned may vary, or be changed, in the progress of development.

5thly.—That in operating for the removal of a tumour of this class, it is extremely important to leave behind none of those minute cysts which often form granules in the surrounding cellular membrane, though it may appear to be in other respects perfectly healthy: this appears to be a mode of extension of the disease, independent of inflammation.

6thly.—That experience teaches us that the infiltrated form of these diseases occurs in the structures in the neighbourhood of the purely adventitious

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growth, when these structures have been the seat of inflammation, and that the chances of success from operation are consequently infinitely diminished when such surrounding inflammation has taken place. The presence of the peculiar matter of the disease, in the interior of vessels, appears to be one of the modes in which infiltration, the result of inflammation, exhibits itself, and is therefore not a valid argument in favour of the pre-existence of such matter in the circulating blood.

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AN

ACCOUNT OF A CASE

IN WHICH

A FOREIGN BODY

WAS

LODGED IN THE RIGHT BRONCHUS.

By Sir BENJAMIN C. BRODIE, Bart., F.R.S.,

SERJEANT-SURGEON TO THE QUEEN, ETC., ETC.

READ JUNE 27TH, 1843.

I am induced to communicate the following history to the Royal Medical and Chirurgical Society, believing that it embraces some points of considerable practical importance, which may be deemed not unworthy of their attention.

On the 3rd of April 1843, Mr. B. being engaged immediately after dinner in amusing some children, placed a half-sovereign in his mouth. By some accident it slipped behind the tongue, and a violent fit of coughing, in which he had the appearance of being nearly choked, was the consequence. This was immediately followed by vomiting, the contents

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of the stomach being ejected with considerable force. He strained two or three times afterwards, but did not again vomit. In the course of the evening he coughed at intervals: but the cough was not violent. A sense of soreness and stiffness of the throat remained for the first twenty-four hours. He experienced little or no inconvenience during the two following days. He was not observed to cough, and he employed himself as usual, being able to entertain some friends at dinner.

On the 6th of April, he was again troubled with a cough. On the 7th he went on a journey into the country, and was more or less exposed to a cold north-east wind for two days and nights. The cough now became aggravated. He expectorated some mucus slightly tinged with blood, and small portions of a substance answering to the description of a thin membrane. He experienced, also, a pain in the right side of the chest, referred to a spot corresponding to the situation of the lower portion of the right bronchus.

On the evening of the 9th of April, he took two aperient pills, one of which was rejected by vomiting some time afterwards. In the act of vomiting, he experienced a sensation as if a loose substance had shifted its place in the chest; and for some time afterwards the cough was much relieved, and the pain in the chest entirely ceased.

On the 11th of April, the cough was again troublesome. There was little or no expectoration. At this time the chest was repeatedly examined,

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with the stethoscope by Dr. Seth Thompson, but no unusual sounds were detected in any part of it.

On Monday the 17th of April, Mr. B. again went into the country, exposed to a cold easterly wind. On his return to London, the cough was again much aggravated.

On the 18th of April, by the advice of Dr. Seth Thompson, he consulted Dr. Chambers, and afterwards myself. From the detail of the symptoms, we were all of us led to believe that the half-sovereign had passed into the trachea, and that it remained lodged in the right bronchus.

On the 19th, this opinion seemed to be confirmed by a very simple experiment, which Mr. B. had himself made in the interval. He had placed himself in the prone position, with his sternum resting on a chair, and his head and neck inclined downwards, and, having done so, he immediately had a distinct perception of a loose body slipping forward along the trachea. A violent convulsive cough ensued. On resuming the erect posture, he again had the sensation of a loose body moving in the trachea, but in the opposite direction, that is, towards the chest.

On the 20th, I saw the patient again, with Dr. Thompson. I now suggested that a further consultation should be held on the case; and, accordingly, on the following day there was a meeting of Dr. Chambers, Dr. Seth Thompson, Mr. Stanley, Mr. Aston Key, and myself. The chest was again carefully examined by means of the stethoscope,

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but no difference in the state of the respiration could be detected. The other indications of the existence of a foreign body in the air-passages, however, seemed to be so strong, that no one entertained any doubt on the subject. At this meeting it was agreed that the experiment, which Mr. B. had himself made, should be repeated in a more complete manner. Accordingly, on the 25th of April, he was placed in the prone position, on a platform made to be moveable on a hinge in the centre, so that on one end of it being elevated, the other was equally depressed. The shoulders and body having been fixed by means of a broad strap, the head was lowered until the platform was brought to an angle of about 80 degrees with the horizon. At first no cough ensued; but on the back, opposite the right bronchus, having been struck with the hand, Mr. B. began to cough violently. The half-sovereign, however, did not make its appearance. This process was twice repeated, with no better result; and, on the last occasion, the cough was so distressing, and the appearance of choking was so alarming, that it became evident that it would be imprudent to proceed further with this experiment, unless some precaution were used to render it more safe.

On the 27th of April, in a consultation of Dr. Seth Thompson, Mr. Aston Key, and myself, it was agreed that an artificial opening should be made in the trachea, between the thyroid gland and the sternum. In proposing this, we had a two-fold object; the one, that if the coin were lodged in any

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part from which it might be safely extracted by the forceps, this method might be had recourse to; and the other, that, if relief could not be obtained in this manner, the artificial opening might answer the purpose of a safety-valve, and enable us to repeat the experiment of inverting the body on the moveable platform, without the risk of causing suffocation. The operation was immediately performed by myself, with the assistance of Mr. Aston Key and Mr. Charles Hawkins; and on it being completed, some attempts were made, both by Mr. Key and by myself, to reach the coin with the forceps introduced through the opening. The contact of the instrument with the internal surface of the trachea, however, induced on any occasion the most violent convulsive coughing. The coin was not seized, nor even felt; and our apprehensions of producing some serious mischief were such, that we did not deem it prudent, at that time, to persevere in our endeavours to remove it.

On the 2nd of May, we again made some trials with the forceps, but always with the same result. A violent convulsive action of the diaphragm and abdominal muscles ensued, on each introduction of the instrument; and the danger of groping in the bronchus, under such circumstances, surrounded as it is by the most remarkable assemblage of vital organs in the whole body, appeared to us to be so great, that we did not think ourselves justified in proceeding further. We were the more inclined to abandon the experiment with the forceps, as we had a strong expectation that a recurrence to the first

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experiment, now that the safety-valve was established, would prove successful.

On the 3rd of May, a consultation was held with Mr. Lawrence and Mr. Stanley. They entirely concurred in the views of Mr. Aston Key and myself, and it was agreed that nothing more should be attempted until Mr. B. had sufficiently recovered from the effects of what had been already done, to admit of his being again inverted on the moveable platform.

A probe, or director, was occasionally introduced into the wound of the trachea, with a view to keep it in an open state; and, on the 13th of May, the patient having been placed on the platform, and brought into the same position as formerly, the back was struck with the hand; two or three efforts to cough followed, and presently he felt the coin quit the bronchus, striking almost immediately afterwards against the incisor teeth of the upper jaw, and then dropping out of the mouth; a small quantity of blood, drawn into the trachea from the granulations of the external wound, being ejected at the same time. No spasm took place in the muscles of the glottis, nor was there any of that inconvenience and distress which had caused no small degree of alarm on the former occasion.

It is unnecessary to describe the progress of the case afterwards. On the 20th of May, Mr. B. had sufficiently recovered to be able to go for change of air into the country, and when I saw him, about a

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fortnight afterwards, the wound of the neck was nearly healed.*

The different results which foreign bodies produce when admitted into the trachea, may be referred chiefly to the differences of their size, weight, and figure. If it be of large dimensions, the foreign body will be lodged, and probably impacted, in the trachea itself, causing, in the first instance, more or less obstruction to the respiration, which becomes aggravated afterwards by the too abundant secretion of mucus from the lining membrane. If it be of small size, it will descend to the lower part of one bronchus (generally the right), or even into one of the subdivisions of it, of course obstructing the respiration in a less degree. If it be of light weight, and of moderate size, having no great irregularity of figure, on every fit of coughing it will be made to ascend to the glottis, threatening, and probably at last inducing, suffocation. If it be more ponderous, it will not ascend in the act of coughing, and the inconveniences which it causes, and the immediate danger, will in one respect be less. In

* For the early part of this history, I have availed myself of the notes of my friend Dr. Seth Thompson, who is nearly related to the patient, and to whom, also, I feel deeply indebted for the kind and zealous assistance which he afforded us during the whole progress of the case.

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the case which I have just related, the symptoms described by the patient led all those who were consulted to believe that the foreign body lay in the right bronchus; and this opinion derived confirmation from some experiments made formerly by Mr. Aston Key, and lately repeated by myself and others, in which it was ascertained, that a coin of the size of a sixpence or half-sovereign, if dropped into the trachea of the dead body, almost invariably fell, by its own weight, into this part of the air-passages. It was evident that the weight of the half-sovereign rendered it nearly stationary in the ordinary position of the body; and to this circumstance may mainly be attributed the comparatively trifling inconvenience which the patient suffered. But it is not to be supposed that the ultimate danger of the case, if the foreign body had been allowed to remain, would have been therefore less; and the records of surgery furnish abundant evidence that, under such circumstances, disease of the lungs sooner or later is induced, and that the death of the patient invariably ensues.

The narrow space which a half-sovereign would occupy in the bronchus, sufficiently explains the failure of the stethoscope as the means of diagnosis. It would appear, however, that even under more favourable circumstances, we cannot, in cases of this description, rely on the information which is afforded to us by the use of this instrument. Mr. Hodgson of Birmingham has furnished me with the history of a case which fell under his observation, in

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which the berry of a plant called the *bladder-senna*, of the size of a large pea, had found its way into the trachea of a boy six years of age. On repeated examinations with the stethoscope, nothing unusual was observed in the state of the respiration; yet, on the seventh day after the occurrence of the accident, the child suddenly expired, and on inspecting the trachea afterwards, the berry was found lodged in it about an inch below the cricoid cartilage. Mr. Phillips, surgeon to the St. Mary-le-bone Infirmary, and librarian of this Society, has informed me of another case, occurring in a little girl two years of age, in which a physician, much accustomed to the use of the stethoscope, had examined the chest with that instrument several times, and in the most careful manner, without detecting anything peculiar in the respiration; yet it was ascertained after death, that a portion of the claw of a lobster was firmly fixed in the trachea, a little above the level of the upper margin of the sternum.

I have already stated, that in making the artificial opening into the trachea, we had two objects in view; and it has been shown, that in the attainment of one of these, our success was as great as our most sanguine desires could have led us to anticipate. Although, before the opening was made, the experiment of inverting the patient on the platform was productive of a most distressing and long-continued spasm of the muscles of the glottis, no such spasm occurred afterwards. The half-sovereign escaped through the aperture of the

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glottis, as easily as it would have done in the dead body; and the small quantity of blood which was ejected at the same time, and which had been manifestly furnished by the granulations of the external wound, sufficiently explains how this happened: as it is not to be supposed that blood could have been drawn into the trachea without the admission of air into it at the same instant. As connected with this part of the case, it may be well here to mention, that the distressing sensations arising from congestion in the vessels of the brain, while the head was in a depending position, were immediately and completely relieved by supporting the forehead with the hand, so as to keep the occiput in some degree inclined towards the back of the neck.

In the other object, for which the artificial opening was made, it must be confessed that we were wholly disappointed. In the dead body, with the assistance of proper forceps, there is no great difficulty in extracting a sixpence or a half-sovereign from the bronchus. But even here it is not always accomplished on the first trial. If the forceps be, as they ought to be, carefully and gently handled, the blades may actually slide over the surface of the coin without any sensation being communicated to the hand of the surgeon which will make him aware of the circumstance: or they may be passed downwards on one side of the bronchus, while the coin lies on the other. In the attempt to seize it, the forceps sometimes grasps the bifurcation of the trachea, or one of the subdivisions of the bronchus, instead of the foreign body.

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Nor will these things appear remarkable to any one who bears in mind, that the parts in which the forceps is to be used are not only out of sight, but at a considerable distance from the surface. Including the depth of the external wound, the instrument must be introduced to the distance of from four and a half to five inches before it reaches the upper extremity of the bronchus, and in order that the whole of the bronchus should be explored, it must penetrate still one inch and a half further. But in the living person, there are difficulties of which no knowledge can be obtained from experiments on the dead body. We found that every attempt to use the forceps occasioned a convulsive action of the diaphragm and abdominal muscles, and violent coughing; and (contrary to the observations of M. Magendie on what happens in experiments on dogs) the result was nearly the same, whether the extremity of the instrument was directed upwards towards the glottis, or downwards towards the lungs. Dr. Williams has shown that the fibres of the whole of the bronchial tubes are endued with a high degree of contractility. The heart and its great vessels, the lungs, and the pulmonic plexus of the pneumo-gastric nerves, are immediately contiguous to the bronchi, and the phrenic nerves are only at a short distance on the forepart. How easy would it be for some unfortunate thrust of the forceps, for which, during a paroxysm of coughing, the hand of the surgeon could be in no wise responsible, to cause some such injury to these important organs as would prove

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fatal to the patient! It was these considerations which made us cautious in the use of the forceps in the first instance, and ready to abandon it afterwards, in favour of a safer method of proceeding.

The foregoing observations are of course intended to apply only to cases like the present, in which the foreign body is lodged in the bronchus or in one of its subdivisions. When it is impacted in the trachea itself, there can be no doubt that it ought to be removed by the forceps, and that this may be safely and easily accomplished. But under all circumstances, we have a right to conclude, that an artificial opening in the trachea must contribute to the security of the patient, and that the establishment of it at an early period, is the first and most important duty of the surgeon.

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SECOND SERIES

OF

OBSERVATIONS

ON THE

PATHOLOGY OF THE EAR.

BASED ON ONE HUNDRED AND TWENTY DISSECTIONS OF THAT ORGAN.

By JOSEPH TOYNBEE, F.R.S.,

SURGEON TO THE ST. GEORGE'S AND ST. JAMES'S DISPENSARY.

READ JUNE 27TH, 1843.

ALTHOUGH the organ of hearing consists of several distinct parts, and exhibits much structural variety, but few successful attempts have hitherto been made to trace the local causes of deafness.

In a former paper, published in the Transactions of this Society,* I gave descriptions of several dissections of the human ear, as evidence of the fact, that the lining membrane of the tympanic cavity is frequently in a diseased condition. Subsequent dissections, and a careful investigation of numerous cases of deafness in living subjects, have led me to

* Vol. xxiv. 1841.

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the conclusion that the most prevalent cause of deafness is chronic inflammation of the mucous membrane which lines the tympanic cavity; and that by far the greater majority of cases commonly called nervous deafness ought more properly to be attributed to this cause. This opinion derives support from an observation made to me by Mr. Swan, that in the whole course of his multiplied aural dissections he has not encountered one single instance of disease in the internal ear; an observation which embodies the result of repeated examinations to which I have myself subjected that part of the organ.

At the same time that I advance this opinion as an inference fairly deducible from more than a hundred dissections, I am far from denying the necessity of more extended researches previous to its validity being admitted.

In the present communication it will be my endeavour to elucidate the different stages of this disease of the mucous membrane, and to point out the various morbid conditions to which it gives rise. In so doing, reference will be made as well to the cases published in my former paper, as to those which are appended to the present. And, bearing in mind the comparative novelty of the subject, it has appeared to me more desirable to state, briefly but accurately, the particulars rather than the general results of the dissections; that the very interesting facts which they will be found to contain,

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may serve as a basis on which to ground future researches.

It is worthy of observation, that though some of the persons from whom the specimens were taken, were known to have been afflicted with deafness during life, and others died of diseases which produced affections of the ear, yet the greater number, while living, were not supposed to be deaf.

This frequent occurrence of pathological conditions in the organs of persons not ordinarily esteemed to be deaf during life, loses some portion of its singularity when more closely investigated. Slight defects of hearing are so common as scarcely to excite even a passing observation, and more serious cases, from the very frequency of the disease,—perhaps the most common to which man is subject,—make but a slight impression. It may therefore be presumed that the ear is often in a pathological condition, though disease may not have proceeded so far as to produce such an extent of functional derangement as would cause serious inconvenience to the person affected, or reveal his infirmity to others.

As this paper is designed to treat principally of the pathological condition of the ear, it is not my intention to enter, at present, upon the causes of the great prevalence of deafness, nor to suggest the means which might be adopted for its prevention and cure. These important points I reserve for subsequent communications, with the simple expres-

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sion of my conviction, that when we shall arrive at a more accurate appreciation of the causes of deafness, the means of alleviating or eradicating the disease will more readily suggest themselves, and aural surgery, freed from the uncertainties which now beset it, will yield to no branch of professional investigation either in interest or importance.

On Inflammation of the Mucous Membrane lining the Cavity of the Tympanum.

The tympanic cavity is lined throughout by a fine membrane, forming externally the interior layer of the membrana tympani; from which it can sometimes be detached without much difficulty.* In this situation it also serves as a partial investment to the chorda tympani nerve, and as a tubular sheath to the tendon of the tensor tympani muscle. Internally it covers the surface of the promontory and the membrana propria of the fenestra rotunda; passes on to the margin of the fenestra ovalis, where it is reflected on the surface of the stapes; and, lastly, surrounds the tendon of the stapedius muscle, and envelopes the ossicula auditus, with their connecting ligaments.

In the healthy state, this membrane is so remarkably thin and transparent, that its presence is not easily detected.† It is composed of extremely fine

* In Dissection No. 47, this mucous membrane was found entire after the complete destruction of the membrana tympani.

† For a detailed account of this membrane, see Dissections Nos. 1 & 2, Medico-Chirurgical Transactions, vol. xxiv.

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and delicate fibres, and in structure exhibits strong analogy to the serous membranes. Over its surface extends a layer of very minute epithelial cells: these again are covered by others, which are flat, broad and elongated, terminating in a row of well-developed and firm ciliæ. The supply of blood-vessels is abundant; but they are so minute, and so rarely distended with blood, that, in the healthy state of the membrane, they are imperceptible. In disease, however, these vessels are very much dilated and surcharged with blood. In young persons the membrane is highly vascular, and when successfully injected, appears pervaded by plexiform ramifications.

Beneath the mucous membrane lie the ramifications of the tympanic nerve from the glosso-pharyngeal. In addition to the branches of this nerve, which have been described by Mr. Swan and Professor Arnold, I have been enabled, by the aid of the microscope, to detect numerous filaments, distributed to every part of the membranous lining of the internal wall of the tympanum; and their presence seems to offer a natural solution of the cause of the very acute pain which is experienced when there is inflammation of this structure.

In a healthy state, a small quantity only of mucus covers the surface of the tympanic membrane: the constant motion of the ciliæ, already mentioned, tends no doubt to prevent its accumulation.

Inflammation of the mucous membrane of the tympanic cavity gives rise to various pathological

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conditions, which it seems to me may be divided into three stages.

In the first stage the membrane retains its natural delicacy of structure, though its blood-vessels are considerably enlarged and contorted (Nos. LII. LIII. and LXIV.), and blood is effused into its substance, or more frequently at its attached surface (Nos. LXXVI. and LXXVII). Blood has also been found between the membrane and the membrana propria of the fenestra rotunda (No. LXXXIX.), and in very acute cases lymph is effused over its free surface (Nos. LXXVIII. and LXXIX.). Instances of the presence of these conditions will be found detailed in the appended account of dissections.

The second stage is characterized by a variety of very important pathological phenomena; the principal of which are the following:—

1st. A very considerable thickening of the substance of the membrane, which is often pulpy and flocculent. In this state the tympanic plexus of nerves becomes concealed; the base and crura of the stapes are frequently entirely imbedded in it; while the fenestra rotunda appears only like a superficial depression in the swollen membrane. Occasionally there is also a collection of mucus.

2nd. Concretions of various kinds are visible on the surface of the thickened membrane. In some cases these have the consistence of cheese, and are analogous to tuberculous matter; in others they are fibro-calcareous, and exceedingly hard.

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3rd. But by far the most frequent and peculiar characteristic of this second stage of the disease, is the formation of membranous bands between various parts of the tympanic cavity. These bands are at times so numerous as to occupy nearly the entire cavity (Nos. XLVIII. and XLIX.). They are found connecting the inner surface of the membrana tympani to the internal wall of the tympanum (Nos. LXIX. and LXXXIX.); to the stapes (Nos. XVI. and XCI.); and to the incus (No. XXXI.). They have also been detected between the malleus and the promontory (Nos. XXVIII. and LXVIII.); as well as between the incus, the walls of the tympanum and the sheath of the tensor tympani muscle (Nos. XIV. and XCVIII.): and they so connect various parts of the circumference of the fenestra rotunda, as to form a network over the membrana propria (Nos. LXXXVI. and LXXXVII.). But the place where these adhesions are most frequently visible, is between the crura of the stapes and the adjoining walls of the tympanic cavity: this, for example, was the case in twenty-four instances out of a hundred and twenty dissections—being a fifth of the number. In one dissection, the bands of adhesion were five in number; and in other instances they were so strong, that, in removing the stapes, the mucous membrane was torn from the surface of the promontory (No. LXXXVIII.). Sometimes, so broad and expanded have been these adhesive bands, as to have assumed the appearance of a membranous veil (Nos. LXX. and LXXI.).

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They have also been known to contain blood and scrofulous matter (Nos. XXXVIII. XXXIX. LXVII. LXVIII. and LXIX.). In some examples the surface of the promontory is rough, and in two instances (Nos. XL. and XLI.) the membrane attached to the base of the stapes was ossified, and the anchylosis of the latter to the fenestra ovalis was complete.

It must appear obviously impossible, that many of the remarkable phenomena which have just been pointed out can be present, without the co-existence of functional derangement, more or less serious, in the organ of hearing. The thickening of the mucous membrane, and deposition of mucus, must necessarily interfere with the course of sonorous vibrations towards the membrane of the fenestra rotunda, and hinder the free action of the stapes.

The bands of adhesion connecting the stapes with the walls of the tympanum, cannot do otherwise than impede the natural movements of the former, which has very frequently been found so firmly attached to the fenestra ovalis, as to require considerable pressure with the scalpel to disengage it. Morgagni states, that he found the cavity of the tympanum intersected by numerous membranes, which impeded the movements of the ossicula;* and it appears highly probable, that these bands of adhesion produce irregular movements in the ossicula. I am inclined to ascribe deafness, and many

* Epist. Anatom. vi. § 4.

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of the distressing symptoms that often accompany it, as noises like the rushing of waters, &c. &c., to the continued pressure exerted on the contents of the labyrinth by the stapes being drawn inwards, as a consequence of the formation and subsequent contraction of the adhesions. In this opinion I have been strengthened by the examination of living persons, having frequently observed, that where the membrana tympani has been removed by disease, or where the contents of the vestibule have not received any impression through the stapes (as in the instance of the latter bone being anchylosed), the patients have heard better than those where satisfactory evidence existed, that the disease consisted in the thickened and adherent state of the membrane under consideration.

Another effect resulting from the pathological conditions apparent in this stage of the disease, seems to be deserving of very attentive consideration. From the interesting researches of Dr. Wollaston,* and the more recent admirable and satisfactory experiments of Professor Müller on the Physiology of Hearing,† it would appear that too high a state of tension of the membrana tympani is an obstacle to the transmission of the sonorous vibrations to the internal ear.‡ In several of the

* Philosophical Transactions, 1820.

† Physiology, vol. ii. p. 1259.

‡ If the membrana tympani be rendered tense, either by forcing air into the tympanic cavity, or by exhausting it, a considerable degree of deafness will be produced.

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dissections, it will be observed that the membrana tympani was bound to various parts of the tympanic cavity by firm bands of adhesion; that in others, the tendon of the muscle was surrounded by thick membrane, while occasionally both it and the substance of the tensor tympani muscle were atrophied. All these changes must most certainly exert an injurious influence upon the membrana tympani; and from them doubtless arise many of the phenomena observable in deafness.*

In the third stage of inflammation of the tympanic mucous membrane, it becomes ulcerated, the membrana tympani is destroyed, and the tensor tympani muscle atrophied. The ossicula auditus are diseased, and ultimately discharged from the ear, and the disease not unfrequently communicates itself to the tympanic walls, affecting also the brain and other important organs. Of this class of diseases I am about to treat at length in a separate communication.

Dissections illustrative of the First Stage of Inflammation of the Mucous Membrane of the Tympanic Cavity.

No. XLIV. From a man, æt. 40, who died from a fracture of the cranium, about twenty days after the accident.

The cavitas tympani.—The membrane lining this

* It is not improbable, that the ligaments of the articulations are, in some degree, affected by the inflammation of the membrane immediately surrounding them.

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cavity is in an inflamed state; its vessels are distended with blood, so as to present the appearance of a ramification of red lines over its whole surface. The mucous membrane is thin and transparent.

Nos. LII. and LIII. From a man, æt. 45, who died of delirium tremens.

Right ear.—The meatus externus natural; mucous membrane and periosteum thin and healthy.

The membrana tympani.—Transparent and nowhere opaque. Neither this membrane nor the meatus presented the dull, white appearance, which is so frequently perceived in living persons afflicted with deafness. The short and long processes of the malleus were distinctly visible.

The cavitas tympani.—The mucous membrane was thin and delicate, presenting no bands of adhesion. It was very vascular, and the blood-vessels had a streaky character.

Left ear in a similar state to the right.

Nos. LIV. and LV. From a woman, æt. 20, who died of injury to the brain.

Right ear.—The meatus externus full of cerumen.

The membrana tympani healthy.

The cavitas tympani contained a large quantity of mucus, which was thick and very tenacious, and entirely concealed the fenestra rotunda. This mucus was composed of fine cells, very similar to those of the epithelium lining its cavity; but interspersed with a few larger masses, of a darker colour, round, and consisting of numerous granules. The mucous membrane itself was much inflamed, and numerous

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blood-vessels intersected it with their ramifications. Fine bands of adhesion connected the ossicula together, and the latter to the walls of the cavity of the tympanum. A firm fold of membrane, of considerable thickness, passed from the circumference of the tympanum to the incus and malleus.

Left ear.—Healthy.

Nos. LXIV. and LXV.—*Right ear.*—The meatus and membrana tympani healthy.

The cavitas tympani presents tortuous vessels of a large size, which traverse the mucous membrane. The latter appears in other respects to be healthy.

Left ear.—Healthy.

Nos. LXXVI. and LXXVII.—From a man, æt. 45.

The right ear.—The meatus externus and membrana tympani healthy.

The cavitas tympani.—The membrane lining this cavity is very red, and thicker than natural. In some parts a sanguineous, serous fluid is effused into its substance; in others, it is found between the membrane and the walls of the tympanum. A large fold of membrane surrounds the heads of the malleus and incus.

Left ear.—The meatus externus and membrana tympani healthy.

The cavitas tympani.—The mucous membrane is thick and very vascular: blood is effused beneath it, and transparent lymph is diffused over some portion of the membrane, so that the stapes is scarcely perceptible. The presence of this lymph in the substance

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of the membrane appears to be the cause of its thickened state. Fine threads of lymph connect the stapes with the membrana tympani. The membrane lining the mastoidal cells was very thick and vascular. Very vascular also was the membrane covering the ossicula; and the substance of the incus is penetrated with orifices as though it were worm-eaten.

Nos. LXXVIII. and LXXIX. From a woman, æt. 45, who died of an extensive burn over the body, face and head. The ears were also burnt, and the cuticle had desquamated from their surface.

Right ear.—The meatus externus.—The membrane was very vascular.

The membrana tympani is concave externally, quite firm and immovable, as if parched and contracted. It is thicker than natural, and presents a white fibrous aspect. Towards its superior and posterior part, the head of the stapes projected through a small round orifice.

The cavitas tympani was much diminished in size from the membrana tympani being drawn inwards; and its lining membrane was inflamed and thick, containing a quantity of opaque serous fluid. The membrana tympani was connected with the internal wall of the tympanum by a quantity of lymph which extended from the opening of the mastoidal cells posteriorly to the Eustachian tube, and filled the greater part of the tympanic cavity. Anteriorly this lymph entirely concealed the stapes, the head of which was found to extend, as already noticed, into an orifice of the membrana tympani. The

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incus was separated from the malleus and stapes, and was free in the mastoidal cells. Several white spherical masses, of the size of a small pin's head, adhered to the mucous membrane, and were found to consist of fine globules of various dimensions, some of which floated in the serum.

Left ear.—The meatus externus is much inflamed.

The membrana tympani is of an opaque white; presents an orifice at the anterior part; is very concave externally, and evidently much drawn inwards.

The cavitas tympani is greatly contracted by the attachment of the membrana tympani to its internal wall, to the membrane of which, as well as to the stapes, which it conceals, it tenaciously adheres. The lining membrane is thick and very vascular, and a quantity of serous fluid and soft lymph are effused over its surface.

The Eustachian tube.—The mucous membrane is healthy to the extent of an inch from the cavity of the tympanum, where it reddens, and is filled by a clot of lymph.

Nos. LXXX. and LXXXI. From a man æt. 40.

Right ear.—Healthy: but the mucous membrane of the tympanic cavity is very vascular, and the vessels tortuous.

Left ear.—Healthy: except that a membranous adhesion connects the upper surface of the stapes with the tympanic wall.

The cavitas tympani.—The inferior osseous wall of the cavity is wanting, in this specimen, and ap-

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pears never to have been developed. The origin of the internal jugular vein frequently corresponds with the inferior wall of the tympanum; but in this instance, the cavity of the tympanum is separated from that of the vein by the walls of the latter only, and the blood which it contains imparts a darker hue to the membrane occupying the lower wall of the tympanum.

No. LXXXIII. From a man æt. 48, who died of fever.

Right ear.—The blood-vessels of the tympanic cavity are very much enlarged and tortuous.

No. LXXXIX. From a man æt. 33, who died in fits, from the effects of a malignant tumour situated in the posterior part of the right lobe of the cerebrum.

Left ear.—The meatus externus and membrana tympani healthy.

The cavitas tympani.—The blood-vessels of the mucous membrane are ruptured in several places, and numerous particles of effused blood are visible beneath various parts of the membrane. There is effused blood also surrounding the base and crura of the stapes, and a further quantity is perceptible in the substance of a band of adhesion which connects the posterior crus of the stapes to the wall of the tympanum, as well as between the proper membrane of the fenestra rotunda and that of the cavity of the tympanum.

Nos. CI. and CII. From an adult man, who died of inflammation of the brain.

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Right ear.—The meatus externus and membrana tympani are healthy.

The cavitas tympani.—The dura mater on the upper surface of the petrous portion is much inflamed, and the numerous blood-vessels are much distended. This vascularity extends from the dura mater into the substance of the bone, and thence into the membrane coating the cavity of the tympanum, the vessels of which are greatly enlarged, while beneath it, in places, there is an effusion of blood. The bands of adhesion connecting the membrana tympani with the surface of the promontory, and the stapes with the wall of the tympanum, are numerous and tough, though nearly transparent.

The Eustachian tube contains a quantity of thick but transparent mucus.

Left ear.—This presents the same appearances as the right. The meatus externus and the membrana tympani are perfectly healthy; the tympanic mucous membrane is permeated by numerous blood-vessels continuous with those of the bone and dura mater: small patches of blood are seen beneath it, and the adhesive bands are very numerous.

Nos. CIX. and CX. From a man æt. 50, who died with effusion of serum in the ventricles of the brain.

Right ear.—The cavitas tympani contains a considerable quantity of serum tinged with blood, and its lining membrane is thick, soft, and vascular. The bone has also a dark hue. That portion of the inferior wall which is formed by the upper surface

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of the carotid canal is porous, and distinctly permeated by vessels from the carotid artery. On inspection of the carotid canal, its tympanic portion is perceived to be dark-coloured, porous, and having a slightly irregular surface.

Nos. CXIII. and CXIV. From a woman æt. 25.

The tympanic membrane was thick and vascular, and blood was effused into its substance.

Nos. CXVII. and CXVIII. From a young man æt. 20, who died of epilepsy. No disease was found in the brain, but the cranium was intensely hard.

Right ear.—The meatus externus healthy.

The membrani tympani is rather opaque, having an orifice at its centre of about half a line in diameter, the margins of which are much attenuated.

The cavitas tympani.—The mucous membrane is highly inflamed, its vessels gorged with blood, and a large quantity of pus covers the membrane at the lower part of the cavity, which corresponds to the fossa jugularis. The vessels proceeding from the internal carotid artery are very large, and surcharged with blood.

There is a thick band of adhesion, soft and vascular in its character, between the lower part of the stapes and the promontory.

Left ear.—The periosteum of the meatus, near to the membrana tympani, is highly vascular. The blood-vessels of the latter membrane are distended, and there is an orifice at the anterior and superior part, of about half a line in diameter. The membrane is thin and soft.

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The cavitas tympani.—The lining membrane is very much inflamed, and adhesions surround the stapes, connecting its head with the membrana tympani. The lower osseous wall of the tympanic cavity is deficient in one place, so that the jugular vein is separated from the cavity merely by its own coats.

Dissections illustrative of the second stage of Inflammation of the Mucous Membrane of the Tympanic Cavity.

Nos. XLV. and XLVI. From a man æt. 60.

Right ear.—The meatus externus contains a considerable quantity of dark-coloured cerumen in contact with the membrana tympani.

The membrana tympani is healthy.

The cavitas tympani appears in a healthy condition: but the crura of the stapes would seem to have been fractured and subsequently re-united.

The Eustachian tube.—The mucous membrane is rather rough; and is lined with a white adhesive mucus.

Left ear.—The meatus externus is lined with a thick layer of white epithelium: and its periosteal coating is very thin.

The membrana tympani is healthy.

The cavitas tympani.—The membranous lining is rather thicker than natural, and somewhat pulpy.

No. XLVIII.—*Left ear.*—The meatus externus is healthy.

The membrana tympani is rather thicker than natural; and, towards the centre, there is an appear-

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ance of redness, arising, most probably, from the presence of blood in the tympanic cavity.

The cavitas tympani contains a small quantity of secretion, dark in colour and nearly solid in consistence. The investing membrane is flocculent, and a considerable portion of the cavity is occupied by fine membranous expansions, by which the stapes is almost entirely concealed.

The Eustachian tube is healthy.

No. XLIX. From a man, æt. 50, who is said to have heard well during life. The right ear only could be obtained.

The meatus externus.—Lined by epithelium as far as the circumference of the membrana tympani. The investment of the meatus bordering on the latter is healthy.

The membrana tympani.—The only vestige of this membrane adheres to the inferior and posterior surface of the osseous ring; and consists of a narrow slip, about half a line in depth, white and opaque, having its free border smooth and defined. Owing to the entire disappearance of the membrane from the upper and anterior part of the tympanic ring, the epithelium of the meatus is here continuous with that of the cavity of the tympanum.

The cavitas tympani.—The investing membrane is very thick and white, and white masses of concrete epithelium fill its depressions. There was no appearance of any ossicle in the cavity; but at its inner wall an elevated portion of thickened white membrane was observed. This being carefully re-

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moved, the long and short processes of the malleus, the long process of the incus, and the head of the stapes, were found to be closely compressed together, and surrounded by a cellulo-fibrous tissue, firmly connecting them to the circumference of the cavity. The head of the malleus and the body of the incus had been thrust upwards into the mastoidal cells; and were not visible till the latter were laid open. The stapes is completely surrounded by the cellulo-fibrous tissue.

The Eustachian tube is pervious, but contains a large quantity of mucus.

Nos. LVI. and LVII. From a man, æt. 40.

Right ear.—Healthy.

Left ear.—Adhesions between the stapes and the circumference of the tympanum. Mucous membrane very vascular and slightly thickened.

Nos. LVIII. and LIX.—*Right ear.*—Healthy: except some slight adhesions from the base of the stapes to the surrounding mucous membrane.

Left ear.—Healthy.

Nos. LX. and LXI. From an adult.

Right ear.—The meatus externus is healthy.

The membrana tympani has a dull leaden hue, and is externally more concave than is natural, while a thick opaque band, $\frac{3}{4}$ths of a line in breadth, is visible at its circumference.

The cavitas tympani is in a great measure occupied by a white, solid substance, which firmly adheres to the circumference of the membrana tympani, and projects from it to the internal wall of the

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tympanic cavity, over which it is so abundant as completely to obstruct the view of the stapes. A firm band of this substance connects the central portion of the membrana tympani with the internal wall of the tympanum. In some parts this white substance has an elastic firmness, like cartilage; in others it is quite hard and calcareous: the latter is the case where it is adherent to the circumference of the membrana tympani. The mucous membrane of the tympanic cavity is thin and transparent; but the osseous surface of the promontory is rough. A large isolated portion of bone extensively occupies the mastoidal cells. The tendon of the tensor tympani muscle had been divided in its canal, to the circumference of which it was adherent. The hard mass found in the tympanic cavity consisted of a delicate membrane with dense calcareous granules dispersed through it, bearing a strong analogy to articular cartilage, when it has undergone calcareous degeneration.

The left ear.—The membrana tympani is somewhat opaque; but in other respects the organ appears to be healthy.

Nos. LXII. and LXIII.—*Right ear.*—The meatus externus contained a large quantity of thin epithelium.

The membrana tympani is rather thicker and more opaque than is natural.

The cavitas tympani contains a considerable quantity of thick mucus; and its lining membrane is opaque, white and thick.

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Left ear.—Healthy.

Nos. LXVI. and LXVII. From a child, æt. 12 years, who died of tubercle of the cerebellum. The lungs and intestines were also tuberculous.

Right ear.—The meatus externus healthy.

The membrana tympani.—The upper half is so thin and transparent, that the stapes, promontory, and fenestra ovalis, are distinctly visible through it. The lower half is opaque. The superior border of the membrane is imperfectly connected with the osseous ring.

The cavitas tympani contained a quantity of translucent viscid mucus, which occupied a large extent of its cavity, especially at the upper part.* The mucous membrane is congested; its blood-vessels are very tortuous; it is thicker than natural, and somewhat pulpy. Large and numerous adhesive bands connected the cervix of the stapes with the upper wall, and its crura and base to the internal wall, of the tympanic cavity.

The Eustachian tube.—The mucous membrane is thick, pulpy and vascular.

* This mucus consisted of a transparent gelatinous fluid, through which were interspersed numerous rounded cells, composed of granules in a circular form In some of the cells the granules were very minute, in others their size was considerable. Not unfrequently a granule of much larger size than the rest seemed to serve as a nucleus. The granular components of these cells were strikingly analogous in their substance to a structural arrangement found in the tuberculous matter of the cerebellum and lungs.

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Left ear.—The meatus and membrana tympani healthy.

The cavitas tympani contains a considerable quantity of mucus, similar in character to that of the right ear. The mucous membrane is thick, soft and vascular. A large fold of it connects the cervix of the stapes and the orbicular process of the incus to the upper and back part of the tympanic cavity. On the upper surface of the cervix of the stapes, and beneath the mucous membrane a small opaque mass was observed, having the appearance of tuberculous matter. When subjected to the microscope it was found to present granules, and cells composed of granules, similar to those in the mucus.

The Eustachian tube.—The mucous membrane was thickened, its blood-vessels congested, and within it was a large quantity of mucus.

Nos. LXVIII. and LXIX. From a young woman who died of tuberculous disease.

Right ear.—The meatus externus healthy.

The membrana tympani is rather hazy.

The cavitas tympani contains a large quantity of thick granulated mucus. The mucous membrane was thick, and almost concealed the stapes. A firm band of adhesion, of considerable dimensions, passed from the extremity of the malleus to the internal wall of the tympanic cavity. This adhesive band was observed to enclose a white opaque matter. The mucous membrane was very congested.

The Eustachian tube appeared to be healthy, with

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the exception of its tympanic orifice; at which point the mucous membrane was much congested.

Left ear.—The meatus externus is healthy.

The membrana tympani is rather dull.

The cavitas tympani is much diminished in size by the adhesions which pass between the membrana tympani and the inner wall of the tympanum. These adhesive bands are firm and broad, and in several places patches of white tuberculous matter are discernible beneath the mucous membrane.

Nos. LXX. and LXXI. From a man, æt. 45, who died of dropsy and effusion on the brain, resulting from renal disease. His urine was albuminous for a long period previous to death.

Right ear.—The meatus externus and membrana tympani had been accidentally removed.

The cavitas tympani.—The mucous membrane was rather thick and soft; and that portion of it which, in a healthy organ, is inflected over the external surface of the membrana fenestræ rotundæ, formed here a broad lamella, extending from the anterior surface of the promontory to the mastoidal cells, and effectually concealing the fenestra rotunda. This membranous veil is attached superiorly to the posterior crus of the stapes, and partakes of the movements of that bone. Another membranous band connects the anterior crus of the stapes with the tendon of the tensor tympani muscle.

The Eustachian tube is healthy.

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Left ear.—The meatus externus and membrana tympani are healthy.

The cavitas tympani.—The mucous membrane is slightly thicker than natural. A membranous veil, similar to that of the right ear, passes from the inferior surface of the crura of the stapes, where they join its neck, to the lower part of the tympanic cavity; fine bands of adhesion connect the upper surface of the tympanum; and the mucous membrane which lines the mastoidal cells, is gathered into a number of fine fibres like a spider's web.

The Eustachian tube.—The mucous membrane is softer and more lax than natural.

Nos. LXXXVI. and LXXXVII. From an adult.

Healthy: except that in the right ear fine adhesions pass from different parts of the circumference of the fenestra rotunda, so as to form a network over its surface.

No. LXXXVIII. From a man, æt. 33, who died in fits, from the effects of a malignant tumour situated in the posterior part of the right lobe of the cerebrum.

Right ear.—The meatus externus contained a considerable quantity of hardened cerumen.

The membrana tympani is healthy.

The cavitas tympani.—The mucous membrane appears white and somewhat thickened. The upper surface of the posterior crus of the stapes is almost in contact with the wall of the tympanum, to which

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it is attached by a short thick band of adhesion,* which prevents the descent of the former bone.

No. XC. From an adult.

Left ear.—The meatus externus and membrana tympani perfectly healthy.

The cavitas tympani.—The mucous membrane is vascular, and presents numerous bands of adhesion, connecting the membrana tympani with the internal wall of the cavity, and the chorda tympani nerve with the long process of the incus.

The Eustachian tube is five or six times its natural size, and near the cavity of the tympanum the bone is rendered rough by the presence of fine osseous spiculæ, which however are covered by the mucous membrane, and appear to be an original conformation. Within about two lines of the cavity of the tympanum the Eustachian tube is so dilated, that its upper wall projects towards the cavity of the carotid canal, from which it is separated merely by a delicate layer of bone.†

Nos. XCI. and XCII.—*Right ear.*—Healthy, with the exception of a band of adhesion connecting the internal surface of the membrana tympani and the chorda tympani nerve with the neck of the stapes. The latter bone was very firmly fixed in the fenestra ovalis.

* This band was so firm that upon removing the stapes, the membrane which covered the latter was lacerated and remains continuous with the adhesion.

† This specimen is now in the museum of St. George's Hospital.

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Left ear.—Healthy.

Nos. XCIII. and XCIV. From a man, æt. 26, who died of consumption. He had scrofulous glands in the neck.

Right ear.—The meatus externus and membrana tympani have been removed.

The cavitas tympani.—The lining membrane is thick and white, and covered by a thick tenacious mucus which completely chokes up the fossa of the fenestra rotunda, and surrounds the base of the stapes. The mastoid cells are also filled with this nearly solid mucus, intermixed with oleaginous globules.

Left ear.—The meatus externus is healthy.

The membrana tympani is vascular and rather clouded, and presents two white bone-like patches, of which the one situated at its upper and anterior part is a line in length and half a line in breadth, while the other, at its posterior part, is two lines in length and one in breadth. These white patches are hard and friable, being apparently composed of fine calcareous granules.

The cavitas tympani contained a quantity of pus-like matter, which on being subjected to examination by the microscope presented characteristics analogous to those of tubercle, and the scrofulous matter of the enlarged gland in the neck. The lining membrane is very vascular and soft, and so is that of the Eustachian tube.

Nos. XCV. and XCVI. From a boy, æt. 10, who died of low fever.

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Right ear.—The tympanic mucous membrane is slightly thickened, and the surface of the promontory is rough and cellular.

Left ear.—Adhesions connect the stapes to the circumference of the fenestra ovalis, and the surface of the promontory presents several ridges.

Nos. XCVII. and XCVIII. From a man, æt. 40, who died of a diseased heart. A large quantity of serum was found in the sac of the arachnoid.

Right ear.—The meatus externus and membrana tympani very vascular.

The cavitas tympani.—A broad fold connects the inferior surface of the stapes to the adjoining wall of the tympanum.

The Eustachian tube.—Its cartilaginous extremity has a worm-eaten appearance.

Left ear.—Healthy, excepting the presence of a band of adhesion in the cavity of the tympanum, connecting the long process of the incus with the sheath of the tendon of the tensor tympani muscle.

Nos. XCIX. and C. From a man æt. 40.

Right ear.—The cavitas tympani. The mucous membrane was thick, soft, and vascular. The fenestra rotunda is remarkably large.

Left ear.—The membrana tympani around the point of attachment of the malleus, is quite white and opaque. At the anterior and inferior part is an oval spot, about a line in length, and half a line in breadth, which is white and hard to the touch, like

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bone.* The rest of the membrane is of a leaden hue.

The cavitas tympani, at its upper part, is completely filled with a mass of calcareous and fibrous matter, exactly similar to that described in Dissection No. LX. The incus appears to have degenerated into this substance, and the stapes is buried in it. It adheres externally to the membrana tympani, and internally to the surface of the promontory, to which it forms a dense coating, and from which it is not to be separated without the exertion of considerable force. The tensor tympani muscle is atrophied, and appears of less than half its usual size; a condition to which it has probably been reduced by the immoveable state of the malleus and membrana tympani.

Nos. CIII. and CIV. From a man æt. 40.

Right ear.—A thick band of adhesion connects the long process of the incus to the membrana and chorda tympani. It is fibrous in structure, and very vascular.

Left ear.—In the same state.

No. CVIII.—*Left ear.*—Healthy; with the exception of the presence of bands of adhesion, completely surrounding the crura and base of the stapes, and connecting them with the adjoining tympanic wall. In both specimens the membranous labyrinth appears to be much atrophied.

* This substance, and that described in Dissection No. LX. have great similarity to the hard deposit in the tunics of arteries.

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No. CX.—*Left ear.*—The cavitas tympani. The mucous membrane is thin; but innumerable bands of adhesion connect the membrana tympani and ossicula with the walls of the tympanum.

Nos. CXI. and CXII. From a man æt. 80, who died of inflammation of the lungs. Tubercles were found in the lungs and in the kidneys.

Right ear.—The meatus externus.—The periosteum of the posterior and exterior part was inflamed, and the orifices for blood-vessels were large.

The cavitas tympani.—The mucous membrane is thick and vascular, and a thick membranous band, of a line in diameter, and almost as firm as the membrana tympani itself, connects the latter with the promontory.

Left ear.—The meatus externus is healthy.

The membrana tympani is slightly atrophied.

The cavitas tympani.—The mucous membrane is slightly thickened. A broad fold of membrane connects the tendon of the tensor tympani muscle with the anterior crus of the stapes, while a second fold proceeds from the promontory to the inferior surface of the crura of the stapes. Bands of adhesion also link the membrana tympani and incus to the inner wall of the tympanum.

Nos. CXV. and CXVI. From a man æt. 40, who died of consumption.

Right ear.—The meatus externus contained a large collection of cerumen.

The membrana tympani.—The long process of the incus is firmly attached to this membrane by a band

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of adhesion. A thick membranous layer conjoins the under surface of the stapes with the surface of the promontory.

The cavitas tympani.—The mucous membrane is thick, and very vascular; and the layer of bone dividing the tympanic cavity from the carotid canal, is dark and full of blood.

Left ear.—The meatus externus full of cerumen, by which the membrana tympani is discoloured. A strong band of adhesion connects the membrana tympani with the long process of the incus, and the stapes is bound to the surface of the promontory by a thick membranous veil.*

Nos. CXIX. and CXX. From a boy æt. 12, who died of disease of the heart.

Right ear.—The membrana tympani presents an orifice of about two lines in diameter at its anterior and upper region. The greater part of the remaining portion is converted into bony laminæ, as in the two other specimens already described.

The cavitas tympani.—The lining membrane is thick and red, and presents a number of fine vascular adhesions, one of which, nearly a line in depth, connects the malleus and inner surface of the membrana tympani to the promontory, and draws the two almost into contact with each other.

Left ear.—The membrana tympani is opaque.

The cavitas tympani.—The lining membrane is

* It is interesting to observe the remarkable symmetry in the diseased appearances of the two ears.

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thick, soft, and very vascular, presenting numerous bands of adhesions, connecting the stapes with the surrounding membrane, and entirely concealing its base. Some of these bands, which fill the intercrural space of the stapes, contain tuberculous matter.

Dissections illustrative of the Third Stage of Inflammation of the Mucous Membrane of the Tympanic Cavity.

Nos. XLVII.* and XLVIII. From a woman æt. 36, who died of dropsy. She was very deaf of both ears, but could hear when spoken to very loudly. No discharge perceived.

Right ear.—The meatus externus contained no cerumen. The glandular integument is white, smooth, and shining, and lined with a slight quantity of discharge. The internal periosteal layer is thicker than natural, white, and rather soft; and is covered, at the floor of the meatus, close to the membrana tympani, by a mass of epithelium and coagulated blood.

The membrana tympani is entirely destroyed, except a small semilunar-shaped remnant, about half a line in depth, adhering to the inferior margin of the meatus.

The cavitas tympani.—This cavity does not communicate with the meatus externus; for the mucous

* For the account of Dissection XLVII. see those illustrative of the second stage of the disease.

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membrane lining the internal surface of the membrana tympani remains entire. It is very soft and transparent, and having lost the support of the membrana tympani, it now covers that portion of the mucous membrane which lines the internal wall of the cavity of the tympanum; between the two portions, however, a small quantity of mucus is interposed. The incus, and the head of the malleus have disappeared, and their place is supplied by a soft, white membrane, a fold of which maintains the cervix of the malleus in its position, and connects it to the circumference of the tympanic cavity. The mucous membrane lining the internal wall of the latter, is rather thick and opaque; but still the nervous plexus can be discerned through it.

The Eustachian tube is healthy.

Nos. LXXII. and LXXIII. From a man æt. 50, who was stated to be deaf of the left ear.

Right ear.—The meatus externus contained a large quantity of thick purulent matter.

The membrana tympani had entirely disappeared.

The cavitas tympani enclosed much purulent matter, and the mucous membrane was soft and pulpy, so that the internal wall and the stapes were completely concealed. The malleus had disappeared, and the incus was separated from the stapes. The tendon of the stapedius muscle was soft and easily lacerated, and the tensor tympani muscle was much atrophied, while its tendon was pulpy.

The Eustachian tube was in the same state as that of the left ear.

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Left ear.—The meatus externus contained no cerumen; and its fibro-mucous membrane is soft and friable.

The membrana tympani was covered with a brown coloured matter, of the consistence of cream, apparently consisting principally of pus, which, being cleared away, disclosed a large orifice in the situation of the anterior and upper part of the membrana tympani. The long and short processes of the malleus were exposed, together with the chorda tympani nerve; the surface of the former being somewhat rough. The lower half of the membrana tympani is thin.

The cavitas tympani contained a large quantity of purulent fluid, and its mucous membrane was dark and quite pulpy, so as to prevent the stapes and the internal wall of the cavity from being perceived. The external surface of the long process of the incus was rough. The tensor tympani muscle was wasted to one half its usual size, and the tendon, at the point of attachment to the malleus, was soft and easily lacerated.

The Eustachian tube.—The mucous membrane was slightly thicker than natural towards its faucial orifice, and towards the tympanum it was soft.

Nos. CVII. and CVIII. From an old man who was very deaf, and who died of gangrena senilis.

Right ear.—The meatus externus and membrana tympani healthy.

The cavitas tympani is very large, and the lining membrane, which is dark in colour, contains thin

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purulent matter. The tendon of the tensor tympani muscle is very soft, and disconnected from the malleus.

The following is a tabular view of the state of the mucous membrane of the tympanic cavity, in the 120 dissections related in the present and former papers.

A. *In the First Stage of Inflammation.*

1	With simple inflammation of the mucous membrane; its vessels being enlarged, tortuous, and distended with blood (44, 52, 53, 64, 80, 81, 83, 113, 114, 118) .	10
2	Ditto with an accumulation of mucus (54)	1
3	Membrane inflamed, with effusion of blood into its substance (89, 101, 102) . .	3
4	Membrane inflamed, with effusion of serum tinged with blood into the tympanic cavity (109)	1
5	Membrane inflamed, with lymph effused into the tympanic cavity (78, 79) . . .	2
6	Membrane inflamed, with blood and lymph effused into the tympanic cavity (76, 77)	2
7	Membrane inflamed, with effusion of pus into the tympanic cavity (117) . .	1

B. *In the Second Stage of Inflammation.*

1	With simple thickening of the lining membrane of the tympanic cavity (29, 62, 93, 94, 99)	5

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2 The membrane thick and pulpy (45, 46) . 2
3 The membrane thick and flocculent (13) . 1
4 Ditto, and the cavity full of bands of adhesion (48) 1
5 Membranous bands connecting the membrana tympani to the inner wall of the tympanum (89, 101, 102, 110, 112) . 5
6 Membranous bands connecting the membrana tympani to the promontory and the chorda tympani to the stapes (90) . 1
7 Membranous bands connecting the membrana tympani to the incus (116) . . 1
8 Ditto connecting the membrana tympani to the stapes (16, 118) 2
9 Ditto connecting the membrana and chorda tympani nerve to the stapes (91) . . 1
10 Ditto connecting the membrana tympani and malleus to the promontory (119) . 1
11 Ditto connecting the membrana and chorda tympani to the incus (103, 104) . . 2
12 Ditto connecting the membrana tympani and ossicles to the inner wall of the tympanum (110) 1
13 Ditto connecting the malleus to the inner wall of the tympanum (28, 68) . . 2
14 Ditto connecting the incus to the inner wall of the tympanum (14) 1
15 Ditto connecting the stapes with the promontory (15, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 30, 32, 35, 36, 37, 57, 58, 66, 88, 108, 115, 117, 120) . . . 24

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16 Anchylosis of the stapes to the fenestra ovalis (40, 41) 2
17 Membranous bands forming a network over the fenestra rotunda (86, 87) . . 2
18 A broad membrane passing from the promontory to the mastoid cells (70, 71) . 2
19 The cavity of the tympanum full of bands of adhesion (49) 1
20 Membranous bands containing scrofulous matter (67, 68, 69) 3
21 The cavity of the tympanum full of calcareous concretion (10, 11, 60, 100) . 4
22 Ditto full of caseous concretion (30, 39) . 2
23 With ridges of the bone projecting from the surface of the promontory (95, 96) . 2

C. *In the Third Stage of Inflammation.*

1 With ulceration and thickening of the mucous membrane attended by the formation of pus (33, 34, 107) . . . 3
2 With ulceration of the membrane and loss of one or more of the ossicula (47, 72, 73) 3

It thus appears that of the 120 dissections there were:—

20 Ears in the first stage of inflammation of the tympanic cavity.
65 Ditto in the second stage.
6 Ditto in the third stage.
29 Ditto in a healthy state.

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I have much pleasure in expressing my thanks to the numerous friends, who have so materially assisted me, in obtaining the specimens necessary to the pursuit of this subject. I shall always be happy to show the preparations which form the ground-work of this paper to any members of the profession, to whom I again take the opportunity of stating, I shall feel much indebted for every opportunity they can afford me of dissecting the organ of hearing, especially when it is diseased.

12, Argyll Place, St. James's,
May 1843.

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ON THE

EFFECTS OF

RICKETS

UPON THE GROWTH OF THE SKULL.

By ALEXANDER SHAW, Esq.,

SURGEON TO THE MIDDLESEX HOSPITAL.

READ JUNE 27TH, 1843.

Some years ago the Society did me the honour to publish in their Transactions, a paper on certain peculiarities in the conformation of the skeleton produced by rickets.* In that paper, my principal object was to show that, independently of the softening and consequent incurvation of the bones to which rickets has been long known to give rise, it has the effect of arresting the growth; and, as between infancy and adolescence, a remarkable change takes place in the relative proportions of the figure,

* Vol. xvii. The same subject was further pursued in two papers communicated by the author to the London Medical Gazette, March 1835, and Nov. 1835.

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so that those of the adult differ widely from those of the child, the progress of that change is interrupted by the stoppage; and the result is, that persons so affected, when they arrive at adolescence, have the configuration characteristic of the child, more or less distinctly marked, instead of that proper to the adult.

Since presenting these views to the Society, my attention has been directed in a more particular manner than before, to the form of the head in individuals distorted from the same disease; and I have observed that there is in this part a want of the correct relative proportions between the two principal divisions of which it consists—the cranium, and the face—analogous to what is found in the body generally. As in prosecuting that inquiry, several questions, interesting both in a physiological and practical view, have presented themselves to my notice, I beg to lay my observations before the Society.

It being necessary for the illustration of my present subject, to point out more fully the effects produced upon the relative dimensions of the figure generally by rickets, I will briefly recapitulate some of the facts contained in my former paper.

The short stature of persons who have suffered during childhood from that disease has often been observed. But it may not have been so commonly remarked that, (making allowance for the loss of height caused by the greater or less incurvations of the bones in such individuals,) certain parts of the

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figure are always stunted to a greater degree than others. The head, trunk, and upper extremities continue about their natural size; while the pelvis and lower extremities are peculiarly diminutive.

This peculiarity may be seen by looking at the shape of those persons deformed from rickets, who are met with in such numbers in the streets of this metropolis. But to verify my observation more accurately, I took the measurements of the bones in the upper and lower divisions of the body in several adult skeletons deformed from the disease; and compared them with corresponding measurements of the natural skeleton. The result was, that whereas the defect of growth in the superior division was equal only to $\frac{1}{13}$th of the whole, it was as much as $\frac{1}{3}$rd in the inferior division.

The cause of this difference may be thus explained. In the process of growth, all parts of the frame do not increase at the same rate. If such were the law of development, the proportions would be the same at adolescence as in childhood. But that is not the case. In the child, the upper part, including the head, trunk, and upper extremities, is of large bulk compared with the pelvis and lower extremities. But in the adult, the head, trunk, and upper extremities are particularly light and small, and the pelvis and lower extremities are broad and powerful. And important objects are attained by this difference in the conformation. The proportions in infancy have reference to parturition; the head is of large size compared with the rest of the body,

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in order that, while the fœtus is floating in the liquor amnii, the head may gravitate to the os uteri, and by closing that orifice prevent the presentation of the hands or feet; and, secondly, that when delivery commences, and the head is expelled first, it may dilate the parts, and allow the hips to pass rapidly, so as to prevent the umbilical cord being compressed and the circulation through the placenta stopped before the child can respire. But the configuration so admirably adapted for the safe delivery of the child is incompatible with man carrying his body erect. To possess that power, which belongs exclusively to him, it is necessary that the pelvis should be expanded, to afford a secure basis for the trunk, and the lower extremities elongated and strong, to give freedom and power of motion to the limbs. Such a change, however, in the relative proportions of the figure cannot be effected except by the growth of the pelvis and of the lower extremities proceeding with greater activity than that of the head, chest, and upper extremities. And this, observation shows, is the actual course by which the several divisions attain their mature form. Hence it follows, that if, by the prevalence of a diseased action capable of retarding the growth, the natural process is interrupted, there will not only be a deficiency of size in all the body, but the change in the relative proportions of the figure which occurs simultaneously will be interfered with; and the patient, when arrived at maturity, will retain, in a greater or less degree, according to the severity or long conti-

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nuance of the disease, marks of the configuration of the child.

Now, as rickets is a complaint of the character referred to (for it is known to be attended with marasmus, or general wasting of the body, and it is owing to the bones being imperfectly supplied with the hardening material which gives them firmness, that they become bent under the incumbent weight, and distortion ensues), we can understand how it should not only prevent the body attaining its full size, but give rise at the same time to that disproportion of the figure which has been described.*

The converse of this condition is observed in the figures of persons whose growth, instead of having been retarded, has been more active than common; as in men of large stature. Since the lower extremities increase at a more rapid rate than the parts above, it follows that the former become of inordinate length compared with the latter. Hence it is

* When I formerly solicited attention to these views, it was principally to point out their importance in connection with the dimensions of the pelvis in child-bearing women, deformed from rickets. It was my object to show, that as in the progress of growth this circle of bones undergoes an increase of its size more extensive in proportion to its original dimensions than any other part of the skeleton, (and the difference is greater in the female than in the male,) the interruption of the growth caused by rickets, gives rise to a correspondingly great diminution in its bulk, compared with the rest of the skeleton. To ascertain the average amount of this deficiency, and thus judge of the share which the consequent smallness of the pelvis has in

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found, that the giant or tall person, distinguished by his long legs and comparatively small body, deviates from the standard proportions as greatly as the ricketty individual, with his large body and short legs.

Of the Proportions of the Head in persons deformed from Rickets.

In entering upon this subject, I may refer again to the opportunities which the streets of this metropolis afford to the observer, of studying the effects produced upon the growth of the various parts of the body by rickets. Since the time of Glisson, England has had the bad reputation of abounding in individuals deformed from that disorder: so that our brethren on the continent have applied to rickets the name of the "English disease." It may certainly be acknowledged, that the close alleys, the ill-ventilated and badly drained courts, of the

impeding the passage of the child in parturition, and causing difficult labour, I took the measurements of twenty-nine deformed pelves from patients of the female sex, and compared them with those of the natural female pelvis. The result was, that the deformed pelves fell short of their normal dimensions, by nearly one quarter of their proper size. So that in women distorted from rickets, two distinct causes give rise to difficult labour. First, the distorted condition of the pelvis, consequent on the softened state of the bones and the compression to which they have been subjected: secondly, the general smallness of the bones, depending on the pelvis having been originally, at childhood, of remarkably diminutive size, and on its growth having been interrupted by the attack of rickets.

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densely populous parts of the city of London, are nurseries where a vast number of distorted and stunted persons are constantly reared; and the disease is not uncommon in the richer classes of the community.

When we observe the shape of the head in such deformed persons, it will be perceived, that one general character belongs to them:—*That whilst the cranium appears unusually large and capacious, the face is remarkably small.*

It is to this want of proportion between the size of the face and of the cranium, that I chiefly desire to direct attention. Owing to the original diversity in the shape, height and features of people generally, the disproportion may be more marked in some than in others; but after extensive observation, I feel confident in stating that it is a never-failing effect of rickets. I would add, that there is a numerous class of persons, who, although not actually distorted, or ricketty, in the common acceptation of the term, present the appearance of having suffered from continued bad health during childhood, and to have been checked in their growth from that cause: they are diminutive in height, and have more or less distinctly marked the relative proportions of the figure characteristic of those deformed from rickets; in such individuals, the cranium is generally disproportionably large, contrasted with the face.

For some time past, I have taken every opportunity of putting the above observation to the test

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of measurement, by measuring the size of the cranium, and of the face, respectively, in the skulls of ricketty skeletons; and then comparing them with corresponding measurements of the natural skull. I have likewise followed the same course with as many deformed persons as I could persuade to allow me to measure their heads for a similar purpose. The details of the different measurements will be found in the table appended to this paper.

By referring to the table, it will be seen that the size of the whole head in ricketty persons is below the standard dimensions. But the degree of that deficiency is much more considerable in the face, than in the cranium. On looking to the part of the table which shows the average dimensions of each division, in all the specimens together, it will be found that, while the cranium falls short of the normal size only by $\frac{1}{21}$th part, the face falls short by as much as $\frac{1}{5}$th. Or, as another means of exhibiting the difference, if the combined measurements of the face, in all the specimens, be taken as the unit with which to compare the similar measurements of the cranium, the size of the cranium in the ricketty skulls will be found to be to that of the face as $7\frac{1}{13}$th to 1; while in the natural skull the ratio is as 6 to 1.

There being no doubt, therefore, that the disproportion here pointed out between the dimensions of the cranium and of the face in persons deformed from rickets, is a general character in such individuals,

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it remains to be explained in what manner it is produced. I will endeavour to show that the appearance may be accounted for by applying to the head the same principle which was made use of in explaining the peculiar configuration of the body, treated of in my former paper.*

* The peculiar form of the head described in the text did not escape the observation of Sir Charles Bell, or Mr. John Shaw. In the third edition of his work on "Expression," now preparing for publication, when treating of the various characters observed in the skull, Sir Charles makes some comments on the antique bust of Esop, preserved in one of the galleries of Rome. After pointing out the remarkable appearance given to the head, by the face being made small and contracted, and the forehead large and overhanging, he observes that these characters are consistent with what the rest of the figure shows, and history records,—that the fabulist was deformed. He assumes that his deformity arose from rickets; and as in that disease the bones generally are in a soft state, and the jawbones must have been in the same condition, he concludes that the powerful muscles of mastication inserted into the lower jaw-bone must have had the effect, by their constant contraction, of compressing both maxillæ, so as to diminish the size of the face. The explanation proposed by my brother did not differ widely from that just noticed. When he wrote on distortion of the spine, it was the common practice, in the treatment of lateral curvature, to encumber the young patient with the weighty machine, now banished from the armoury of such practitioners, called "Cheshire's" instrument. One essential part of that apparatus was a chin-strap suspended from a rod which arched over the head, and sustained the trunk by coming under the chin. Mr. Shaw thought that the effect of the constant pressure of this strap upon the lower jaw was to impair its growth, and thus give a contracted appearance to the face. But neither of these modes of accounting for the peculiar form of the head, if properly scrutinized, will be found satisfactory.

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Of the change which occurs in the relative dimensions of the Cranium and Face during the growth of the Head.

It is well known to physiologists that, independently of the increase which takes place in the general dimensions of the head as it grows between infancy and adolescence, a change is simultaneously produced in the proportions of the two distinct parts into which it is commonly divided—the cranium and the face. The head of the child is remarkable for the large size of the cranium, and the comparative smallness of the face. But as the growth proceeds, this conformation undergoes a gradual change: the face acquires each year a progressively larger size compared with the cranium, until at adolescence, it is of great bulk and capacity, while the cranium is relatively small, and the proportions thus become nearly the reverse of those at infancy.

This change in the proportions has relation to the difference in the development of the important organs to which each division of the head is peculiarly subservient. The chief use of the cranium is to contain and give protection to the brain; and the brain is remarkable, among all the organs of the body, for the advanced condition of its development at an early period of life, and for the little progress which it makes in adding to its size, when the growth is still proceeding actively in the rest of the frame. From the tables recently

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published by Professor Reid,* it appears that the brain weighs nearly as much at about five or six years of age, as it does at adolescence. This circumstance may account for the bones of the cranium undergoing such a trifling change in their dimensions after the first years of childhood. With regard to the bones of the face, their bulk is made up chiefly of the two maxillary bones, and of those processes, which, by projecting from the adjoining parts of the skull, afford extensive origin to the powerful muscles inserted into the lower jaw. The main, if not exclusive use of both jaw-bones, is to give lodgment to the teeth; and their growth, therefore, bears relation to these parts. As the teeth are developed at a slow rate compared with other structures of the body, and it is not till adolescence that the permanent set have acquired the long and powerful fangs by which they are firmly socketed in the jaws, it follows that the maxillary bones continue adding to their bulk, in correspondence with the increasing size and number of the teeth, till that period. Then, as the muscles which operate on the lower jaw become larger and more powerful in proportion as the jaws and teeth increase in magnitude, the processes of bone from which they arise, and which contribute to make up the bulk of the face, get proportionately

* See the London and Edinburgh Medical and Surgical Journal, for April 1843.

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larger and more prominent at the same time. Hence the whole face goes on increasing in size long after the cranium has ceased growing; and a change in the relative dimensions of the two parts is the necessary result.

To show numerically the difference between the rate of growth in the cranium and the face, after the few first years of childhood, I took the measurements of each of these two divisions, first in the skull of a child four years old, and then in the skull of an adult, and compared them together. I found that, whereas the cranium had increased in size only to the extent of $\frac{1}{8}$th of its full dimensions, the face had increased as much as $\frac{1}{3}$rd. Again, on taking the face as the unit of comparison, I found the size of the cranium, at four years of age, to be to that of the face as 8 to 1, while at adolescence it was only as 6 to 1.

It thus appears that there is an analogy between the mode of growth of the head, and that of the entire body: that as in the body, the lower division, consisting of the pelvis and inferior extremities, is developed at a quicker rate than the upper division, consisting of the head, trunk and superior extremities, so in the head, the face is developed at a more active rate than the cranium.

Rickets, by interrupting the growth, prevents the Head acquiring its proper adult form.

It may now be understood how a disease which

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arrests the growth, as rickets has been proved to do, will produce the same effects upon the figure of the head, as it has been shown to give rise to in the body generally. Besides causing a general smallness of the head, it will occasion a disproportion between the parts of which it consists. As the two divisions, the face and the cranium, grow respectively at different rates of activity, it must follow that when the whole process is interrupted for a certain time, the stoppage will have a more decided effect upon the one than upon the other—upon the division which grows at a rapid rate, than upon that which grows at a more moderate rate. Hence as it is the face which is developed in the most active manner, and the cranium which increases at a slow rate, we may expect to find that there will be a very considerable defect in the size of the face, and only a trifling defect in that of the cranium. In other words, in persons whose growth has been interrupted by rickets, the face will appear extraordinarily diminutive, while the cranium will retain about its natural dimensions. Or the same thing may be expressed otherwise: as during the natural course of the growth, a change is gradually effected in the relative dimensions of the head, so that the face, which was originally small compared with the cranium, becomes eventually much larger in reference to the same part, it follows that when the process is arrested, the progress of the change in the proportions is also interrupted, and the head therefore retains at adolescence the characters,

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more or less distinctly marked, which distinguish it at infancy. Now this corresponds with the description which has been given of the actual condition of the head in ricketty persons. The table shows that, taking the dimensions of the face as the unit of comparison, the relative size of the cranium to that of the face in the child, is as 8 to 1 : in the adult of normal proportions as 6 to 1 ; while in the adult whose growth has been interrupted by rickets, it is as $7\frac{1}{13}$th to 1 ; that is, the ratio in such individuals is intermediate between what it is in the child and the adult.

It may accordingly be perceived, that the effect produced by rickets on the form of the head resembles exactly that which was shown, in my former paper, to be produced from the same cause, on the configuration of the body.

Of the proportions of the Head in persons above the standard size.

When persons grow above the standard height it of course implies that the process of growth must have been carried on in these individuals with preternatural activity. It is therefore interesting to observe the effect which that acceleration produces on the relative dimensions of the cranium and the face; and to ascertain whether it be the reverse of what is produced when the growth is retarded by rickets.

As, of the two divisions of the head, the face

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grows at a quicker rate than the cranium, it is natural to expect, that when the process generally has an increased impulse given to it, so that both parts advance, each in its own ratio, more rapidly than usual, the face will acquire a much greater additional size than the cranium. This corresponds with what we observed in the body generally, where the two divisions growing at unequal rates, it was found that when the growth was accelerated, the lower extremities which grow most quickly, became disproportionately large and elongated compared with the head, trunk and upper extremities, which grow at the slowest rate. Accordingly, in the heads of tall, overgrown persons, we may look for the face being of extraordinary large size, and the cranium of relatively small dimensions. Now that is just the character of the proportions in such persons: and those who reside in London have excellent opportunities of verifying the observation, by attending to the relative size of the two divisions of the head in those fine, gigantic men, who belong to the household troops. It must have been often noticed that the features and countenances of these men are peculiarly large and strongly marked, while the cranium does not exceed the ordinary size: that although they have broad cheeks, large jaws, and overhanging eyebrows, yet the foraging caps which they wear in their undress, do not appear larger than those which would fit men of common

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height.* To confirm my statement more accurately, I took the measurements of the cranium, and of the face, in the skull of the remarkable skeleton of the giant, preserved in the Museum of the College of Surgeons, the height of which is within three inches of eight feet; and I then compared them with those of the skull of standard size. I found that in the circumference of the cranium, immediately above the supraciliary ridges, the difference in favour of the gigantic skull was not more than $\frac{1}{8}$th of the whole measurement, while in the face, it was as much as $\frac{1}{3}$rd. Again, on taking the measurements of the face again, as the unit of comparison—while in the skull of standard size the dimensions of the cranium, as we have already seen, are to those of the face as 6 to 1, in the skull of the giant they are only as 5 to 1.

Accordingly the extremes in the disproportions of the adult skull, depending on the causes which have been explained, are as follows:—In the person stunted from rickets, the cranium is to the face as $7\frac{1}{15}$ to 1; in the gigantic person as 5 to 1. The former, in a partial measure, exhibits the conformation of head characteristic of the infant: the latter, that proper to the adult, but in an exaggerated or caricatured manner.

* An army clothier who furnishes the caps for one of the regiments of Horse Guards, has informed me that the size provided to these troops, is as nearly as possible the same as in those supplied to the regiments of the line, for men of common stature.

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The size of the Orbits does not vary with the varying dimensions of the Face.

A curious fact concerning the capacity of the orbits in skulls of different sizes, came under my observation when pursuing the above measurements.

Having proved in the manner just related, that owing to the inequality in the rate of growth in the two divisions of the head, considerable variations take place in the proportions of these parts according to the activity of the process, I was desirous of ascertaining whether the orbits participate in the same changes. As these cavities are more particularly parts of the face, it was interesting to observe whether they were unusually enlarged in those skulls where the face generally is large, or diminished where the face is small; or if, on the contrary, they preserved a uniformity in their size, corresponding to the uniform dimensions of the eye-ball and its appendages lodged within them.

With the view of determining this point, I kept a record of the dimensions of the vertical and horizontal diameters of the outer circumference of the orbits, in all the different skulls which I examined. The list, therefore, exhibits the sizes of the orbits in skulls of all different dimensions, from that wherein the face is of the smallest size, as in the skulls affected with rickets, to that where it has attained the largest size, as in the skull of the giant.

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If this list be examined, by running the eye along the line of figures which shows the measurements of the orbits, it will be perceived, that there is scarcely an appreciable difference between the dimensions of these parts in any of the skulls. Whether we take the ricketty skulls, those of standard size, or the skull of the giant, the diameters of the orbits measure the same in all. As they are not below the standard dimensions in the ricketty specimens, so they are not above them in the giant. The question therefore arises, how is this apparently anomalous fact to be accounted for?

It may be explained by observing the varying sizes of two chambers in the bones of the face, situated in the immediate proximity of the orbits—the frontal and maxillary sinuses. These cells are placed in such a manner in reference to each of the sockets, that the frontal sinus lies directly above, while the maxillary sinus lies directly below the cavity of the orbit: one of the walls or boundaries of the former forming the principal part of the roof, and one of the walls of the latter, the floor of each orbit. From this anatomical relation, it follows, that a correspondence is preserved between the size of the sockets and that of the two sinuses: for it is obvious that if the sinuses increase in their capacity, they will encroach in a proportionate degree upon the cavities of the orbits above and below, and so diminish the relative size of these parts; and if they be of diminutive capacity, they will encroach the

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less upon the orbits, and therefore allow them to be of comparatively greater size.

Now I have satisfied myself by carefully examining the size of the frontal and maxillary sinuses in skulls of different dimensions, that where the face generally is largely developed, these cells are expanded to a great degree, and constitute the chief part of the bulk around the orbits: whereas in those skulls where the face generally is diminutive, they are correspondingly small. And that agrees with what we might expect from knowing the manner in which these cells are developed. Neither the frontal nor maxillary sinus exists in the skull of the infant: they are only to be discerned when the bones of the face have advanced considerably in their growth; and it is not till the skull has reached maturity, that they attain their full size. It is therefore natural to suppose that when the process of growth is unusually active these cells should become of large size; and when it is retarded, they should be of small dimensions.

Accordingly we may conclude that, whatever other uses the frontal and maxillary sinuses may serve, they are placed in the peculiar positions which they occupy in reference to the orbits, for a special object—that by becoming enlarged to different degrees in correspondence with the varying rate of growth in different persons, they may regulate the size of the orbital cavities; so that whether the face be larger or smaller than the standard size, a uniform relation may be always preserved between

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the capacity of the orbits and the size of their contents.

Further remarks on the general form of the Head, in Rickets.

Having noticed the effects produced upon the orbits by the difference in the development of the frontal and maxillary sinuses, I may advert briefly to certain peculiarities in the shape of the forehead, which are to be ascribed to the same cause.

It must have struck all those who have observed the form of the front part of the head as it is generally presented in ricketty persons, that it is characterised by being remarkably square and full. To such a degree does the prominence here referred to commonly amount, that the forehead projects beyond the level of the face, and the facial line, drawn from the top of the head downwards, inclines inwards, instead of advancing forwards, as in the skull of normal shape. I may add that this broad and projecting condition of the forehead is often looked upon with satisfaction, as indicating a corresponding enlargement of the brain at that region; and the individual is therefore considered to have a finely developed head.

It must also have been noticed, that in persons of large stature, the front part of the cranium, instead of being unusually prominent, generally shelves backwards, so as to produce a low forehead; and a vulgar

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idea also prevails that there is a positive smallness of this part of the skull, as contrasted with the normal dimensions.

But this difference in the appearance of the head, in persons of short and large stature, does not depend on an actual difference in the capacity of the frontal region of the cranium, but on the different size of the frontal and maxillary sinuses which adjoin that part. Owing to the relative situation of these cells to the forehead, the front part of the head appears either largely developed, or the contrary, according as the sinuses are expanded to a great size, or the reverse. For, as the frontal cells occupy the lower boundary of the forehead, and in the natural condition of the head, cause that slight fulness above the orbits, called the supraciliary ridges, on which the eyebrows rest, it follows that if they are of large size, they will project beyond the level of the superior part of the forehead, and make it recede to a proportionate degree; and that if they be small, there will be a deficiency in the part below, and a corresponding prominence above. Again, as the cheek bones and the zygomatic processes rest on the summits of the maxillary sinuses, and project to a greater or less degree in proportion as these cells are large or small, so that the upper and lateral parts of the face, just below the temporal regions of the cranium, are either protuberant or narrow, according as the maxillary sinuses are expanded much, or the reverse,—it follows, that the lateral parts of

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the frontal bone, will appear remarkably full, or imperfectly developed, according as the sinuses are of large or small dimensions.

Hence, although children labouring under the effects of rickets are generally distinguished for precocity in their mental faculties, and the same acuteness of mind, which thus results primarily from disease, when judiciously cherished by education, is frequently found to be retained by the adult, so that persons with this kind of deformity are often noted for their superior intellectual attainments,—it cannot be said that the condition of mind has any connection with the peculiar breadth and prominence of the frontal region which has been described: because that appearance does not indicate an enlargement of the cranium, but only a comparative smallness of the face.

On the effects produced by the interruption of the growth from Rickets, upon dentition.

The teeth, it is well known, do not grow as integral parts of the skull. On the contrary, they differ from bone both in constitution and structure, and have a perfectly distinct mode of formation. While the maxillary bones progressively increase in dimensions by a process of growth common to the rest of the skeleton, a succession of teeth, each separately developed in the interior of the jaw-bones, and adapted in size and number to their capacity for containing them, is in the constant course of being

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evolved. When the jaw-bones become too large for the teeth first formed, another set, accommodated to the adult size of the bones gradually replaces the original series.

This short account of a process with which every one is familiar, is enough to show what an exact relation must exist, during the whole period of growth, between the increasing size of the maxillary bones, and the formation of the teeth. To enable each distinct tooth to appear above the gums, and fall into its appropriate place in the ranges of the teeth of both jaws, just at the time appointed, it is obvious that the bones and the teeth must accord in their growth with the nicest accuracy; and if one of the parts, as the bones, be interrupted in its growth, even if it be for a short period, there is danger of all the subsequent stages of the process being materially deranged.

After what has been stated in the preceding part of this paper regarding the effects produced by rickets upon the growth of the skull, no doubt can be entertained that the maxillary bones are retarded in their development, in children affected with that disorder, in common with the rest of the face. And as it is at the period of life when the most important parts of the process of dentition are in course of being carried on, that the disease commonly prevails in an active state, it is evident that the stoppage of the growth of the jaw-bones at that time must have a decidedly injurious influence on the development of the teeth.

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It would be interesting, in connection with the present inquiry, to determine how far the teeth participate in a direct manner in those changes which rickets produces on the osseous system generally. That the parts of the teeth which are completely formed before the disease begins, should undergo any alteration of structure in consequence of the disease, is extremely doubtful: but it is not improbable that the portions still in progress of formation while the disease continues, may be affected by the morbid influence. As far as I can ascertain, however, this question has not hitherto been properly investigated: at least, since the many interesting discoveries concerning the minute structure of the teeth, recently made by microscopical observers, have had the effect of introducing so much more certainty than existed before into observations on this subject.

But putting that view aside for the present, there are two principal circumstances—the one connected with the growth of the teeth, the other with that of the maxillary bones—to which it is necessary to attend before we can comprehend fully the effects to which rickets is likely to give rise upon dentition.

In regard to the first point, namely, the growth of the teeth: it is to be observed that there is an essential difference between the very first steps of that process and the growth of the jaws. This contrast is so great, especially with reference to the crowns, which constitute the chief bulk of each tooth respectively, that whereas the maxillary bones, in

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common with the rest of the skeleton, increase in size slowly and progressively, these parts of the teeth are as large, and occupy as much room in the jaws at the outset of their formation, as they are capable of doing at the termination. This fact is explained by the teeth being formed in the substance called the pulp, and by their growth proceeding from without inwards, so that the external layers on which the ultimate size and shape of each depend, is deposited first, instead of last. Now, although this description applies correctly to the formation of the crowns only, for the fangs are developed later and in a more progressive manner, it may be perceived how important the fact is for throwing light upon the mode in which rickets, by arresting the growth of the jaws, must affect the development and successive rising of the teeth. As it is found that while the jaws are only commencing their growth, and are still of diminutive size, the crowns of a certain number of the teeth not yet emerged above the gums, are of as great bulk as they are destined afterwards to be (having been formed of these dimensions with the prospective design of being adapted to the mature size of the jaws), it is obvious that when the maxillary bones are interrupted in their growth, and are prevented reaching their full size, the teeth will be too large for them—there will be a want of correspondence between the size of the teeth, and that of the part of the jaw-bones allotted for containing them. Hence the effect will be, that the teeth will be wedged closely

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together within the jaws, that they will make their way to the surface with pain and difficulty, and assume an irregular appearance when they have risen above the gums.

The second point to be noticed relates to an important observation made by Mr. John Hunter, concerning the growth of those portions of the jaw-bones in which the teeth are placed.

In examining the mode in which the permanent teeth succeed the deciduous set, Hunter was led to conclude that the posterior division of that portion of each maxillary bone which is destined for the reception of the teeth, grows with greater activity than the anterior; that while the anterior division remains, between childhood and adolescence, almost stationary in size, the posterior division acquires a large accession to its dimensions. He was brought to form that opinion from the following course of observation and reasoning. Upon looking to those teeth alone, belonging to the permanent set, which take the places of the entire deciduous set, that is, taking the twenty permanent teeth of both jaws, extending backwards in each jaw to the second bicuspids (these being the permanent teeth which succeed the last of the deciduous set) and the twenty deciduous teeth, and comparing their collective size with each other, he observed that there was only a trifling difference between them. He inferred, therefore, that the parts of the jaws which first held the deciduous teeth, cannot have enlarged

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much during the period when they were shedding and giving place to the corresponding number of permanent teeth, but must have continued about the same dimensions throughout. But as room must be formed in the jaws of the adult, behind the place occupied in the child by the last molar teeth, that is, in a part where no teeth existed before, for the lodgment of the large permanent molar teeth; and as that can only be obtained by a proportionate addition being made to the jaw-bones at that part, it follows, that the growth must proceed with great activity at the posterior division of the jaws during the rising of the molar teeth. The degree of that activity of growth, compared with the rate in the anterior division, may be estimated by observing that the size of the part of the jaws which contains the molar teeth, is about equal to that which contains all the others situated anteriorly.

It is obvious, therefore, that if, while the evolution of the teeth is still going on, the growth be interrupted for a time, the effect will be greatest upon those portions of the jaw-bones which grow at the quickest rate; that is, upon the posterior portions containing the permanent molar teeth, than upon the anterior portions. That such is the case, at least as regards the superior maxillary bones, we have already had evidence of an indirect kind to prove. It was shown, when treating of the effect produced on the size of the orbits by the frontal and maxillary sinuses becoming developed to a greater or less degree in

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proportion to the activity of the growth, that these sinuses were remarkably diminutive in persons retarded in their growth by rickets. Now as the maxillary sinuses are in anatomical relation at their inferior parts with the divisions of the jaw-bones superadded to give lodgment to the permanent molar teeth (for the alveolar processes of these teeth together form the floors of each of the sinuses), it follows that when the sinuses are generally small, the parts in which the molar teeth are contained must likewise be small. Hence, the obvious effect will be, a want of due proportion between the size of the molar teeth and that of the portions of the jaws intended to lodge them—the teeth will be too large for the jaws, in these parts.

The above views seem to me not undeserving the attention of those members of the profession, who, from the particular department of practice which they follow, have more ample opportunities than others of observing the derangements of health commonly supposed to depend on a disturbed state of the process of dentition. It is also to be conceived that they will be interesting, in a peculiar manner, to the dentist.

Since they occurred to me, I have not had sufficiently extensive means of judging how far they may be applied with advantage to the elucidation of disease, so as to express any confident opinion on that subject. But I will offer the following remark as a suggestion to those who may intend prosecuting

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the inquiry. In observing the diseases of children which take place at the period of teething, we are perhaps too much in the habit of referring the derangement of health to the condition of the teeth; as if the difficulty and pain in protruding the teeth above the gums were the first and original cause of the disorder. It may perhaps be found, by pursuing our observations with more care, that the constitutional irritation proceeding from this cause is a secondary, rather than a primary object of our attention. It is not improbable, in short, that the disturbance in the process of dentition has itself resulted from previous constitutional derangement. It may happen that, owing to a bad state of the health analogous to rickets, and independent of the state of the teeth, an interruption may have been produced in the growth of the maxillary bones; and from that has arisen a want of correspondence between the size of the teeth and of the bones, sufficient to account for the derangement of the teething.

Before quitting this subject, I beg to refer to the valuable researches of my colleague Dr. Ashburner, into the question of the influence of protracted and difficult dentition, in giving rise to various obscure forms of disease in persons more advanced in life than children. It appears to me that the views brought forward in the present paper, may throw considerable light on the causes of the want of relation between the size of the jaws and of the teeth,

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to which that gentleman attaches so much importance, in explaining the derangements to which he refers.*

In conclusion, I may here give a short description of a remarkable condition of the teeth and jaws, which I have had the opportunity of observing since beginning this paper, in a patient greatly distorted from rickets, who is at present in the Middlesex Hospital. I have observed in numerous persons deformed from that disease, great crowding, accompanied with much displacement and irregularity, of the teeth in both jaws, apparently produced from want of proportion between the size of the bones and that of the teeth; but in none have the effects been so distressing as in the case to which I refer. The patient is a girl, seventeen years of age, who was admitted into the hospital under the care of my colleague Mr. Arnott, for fracture of the left thigh bone. Her whole body is distorted in the manner usually seen in those who have had rickets in early childhood, but to an aggravated degree such as we seldom witness. On looking to the curved and twisted state of the legs, it is only surprising that she should have been able to walk before she met with the fracture. In regard to the appearance of the head, it is particularly remarked that it has the proportions of the child about six or eight years of age, instead of those of a person of her time of life;

* On Dentition, and some coincident Disorders. By John Ashburner, M.D. 1834.

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and so much does this peculiarity in the proportions of her head deceive those who are asked to guess her age, that she is invariably supposed, at first, to be only about eight years old. Both jaws are remarkably small; and the teeth present several irregularities. The first thing which attracts our notice, is the disproportionately large size of the crowns of the front teeth when compared with the smallness of the jaw-bones. The next, is the great number of teeth which are wanting, without there being sufficient room to receive additional ones. Although the patient has arrived at that period of life when she ought properly to have the full complement of permanent teeth, she has only fourteen teeth altogether in both jaws; and the vacant spaces which mark where the teeth that have dropped out were formerly placed, are all so narrow that it would be impossible for them to contain a sixth part of the teeth that are lost. Another circumstance marks in a striking manner, by the distressing effects to which it gives rise, the want of correspondence which must have existed, during the growth, between the development of the teeth and of the jaws: although the crowns of most of the teeth, as already mentioned, are large enough to be adapted for jaws of full size, the fangs are extremely small, and the sockets correspondingly shallow and imperfect; the consequence of which is that these teeth are all quite loose; so that they can be easily shaken to and fro with the fingers, and it is with great pain and difficulty that she chews her food.

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	Giant's skull, height 7ft. 9in.	Average of six adult skulls.	Average of two skulls at birth.	Skull, five to six years of age.	Rickets. Adult.	Rickets. Adult.	Rickets. Adult.	Rickets. Adult.	Average of the ricketty skulls.	Average of heads of seven ricketty persons	Average of of heads of three adults. Normal.
CRANIUM :—											
Circumf. of skull above supracil ridges.	22⅜	21¼	13⅛	18¾	19⅝	21	20	20⅛	20¼	21¼	22⅛
FACE :—											
From naso-frontal suture to chin.	6	5	1¾	3¼	3⅝	3⅛	3⅜			4 1/10	5
Meatus auditor. ext. to symph of up. jaw.	5⅜	4½	2½	3½	3⅞	3¾	4	3¾		4⅝	5⅛
One os malæ to the other.	5½	4⅝	1½	3½	4⅛	4	3⅜	4⅛		4¼	4⅜
Front pr. of up jaw to edge of alveol.	3⅛	2½	1½	1⅜	2	2½	2¼	2¼			
Poster. molar tooth of one side to other.		2½		1⅞	1⅞		1⅝	1¾			
Angle of low jaw to symphysis.	5½	4 1/16	1½	2⅝	3¼	3¼	3¼			4	5¼
Articul. surface to angle of jaw.	3¾	2⅜	⅞	1½	2⅛	2⅛	2				
One angle of jaw to other.	4⅝	3½	1⅞	3	3⅜	3⅛	3			2 1/16	3
Chin to edge of alveolar proc.	1⅜	1¼		⅞	⅞	⅞	1				
Average of the dif. meas. of face.	4⅛	3 7/19	1⅜	2½	2⅞	2⅞	2⅞	2⅞	2⅞	3⅛	4 7/10
Proportion of cranium to face as unit.	4⅝	6	8½	7½	6 1/11	7½	7½	7	7 1/13	5⅜	4⅜
ORBIT :											
Longitud. diameter of orbit.	1⅜	1⅜	¾	1¼	1½		1¼	1½			
Transverse diameter of orbit.	1¾	1½	⅞	1¼	1⅝		1½	1⅝			

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ON THE

PRESENCE OF SPERMATOZOA

IN THE

FLUID OF HYDROCELE,

By E. A. LLOYD, Esq.,

ASSISTANT-SURGEON TO ST. BARTHOLOMEW'S HOSPITAL, AND SURGEON TO CHRIST'S HOSPITAL.

READ JUNE 13TH, 1843.

In the early part of last winter I operated in a case of hydrocele, in the fluid of which there were discovered numerous spermatic animalcules. The situation of the fluid was such that there was no reason to doubt the case being "hydrocele of the tunica vaginalis testis." Moreover, the fluid appeared to the unassisted eye to be similar to that which is commonly found in the ordinary form of that disease. There were about fourteen ounces of it.

That it contained spermatozoa was quite accidentally discovered. I had preserved it to be used as a menstruum with which to dilute some blood for the purpose of microscopical observation. I did not examine it till some hours after it had been

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abstracted, when it had become quite cold. In this state I put a little of it into a glass, and added to it a small portion of a drop of blood, so that I might see the blood disks separate and quite insulated. It was under these circumstances, while examining the fluid with the microscope, (using an object glass of $\frac{1}{8}$th of an inch focal length, the magnifying power being from 500 to 600 diameters,) that I observed numerous spermatozoa interspersed among the blood disks. I was at a loss how to account for the presence of the animalcules. I thought at first that the glasses between which I examined the fluid might not have been clean, and might have had some dead spermatozoa adherent to them, as I had been a short time before occupied in investigating the spermatic fluid. But it was quickly proved that the fluid of the hydrocele was the sole source of the animalcules, many of them being discovered in every drop of the fluid which was subsequently examined. They corresponded in size, as well as in form, with the animalcules found in human spermatic fluid, as was demonstrated by measuring them with the micrometer. The fluid of the hydrocele, in the precise condition in which it was abstracted, contained, in addition to the spermatozoa, a few blood globules, small roundish granular bodies, some apparently empty, nearly colourless cysts, and many masses of opaque matter, which seemed to be made up of portions of epithelium.

Since meeting with the preceding case, I have availed myself of every opportunity of examining

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with the microscope the fluid taken from hydroceles. I have made the examination in about thirty cases, and in two of them the fluid was ascertained, as in the former case, to contain living spermatozoa.

The next case was met with a few weeks after that which is stated above.

The patient was a widower, ætatis 63. He had had hydrocele for many years, and I had previously operated on him 15 or 16 times. The disease was on the left side. The testicle of the other side was perfectly healthy.

On this occasion I drew off sixteen ounces of fluid, of a greenish yellow colour, and so albuminous as to be quite adhesive.

The moment my patient had left me, I examined the fluid with the microscope, using the same magnifying power as in the former case, and at once perceived numerous living spermatozoa swimming about in every direction. A friend of mine who was in the house at the time, and who was familiar with the appearance of spermatozoa, examined them with me; and we continued to watch them for nearly three hours, during which time they were actively moving about. Some died sooner than others, but we left many of them in full play. They seemed to die as the fluid between the glasses on which they were placed, evaporated, those nearest the centre continuing longest in an active state; and as they died, there was visible in them a heaving, an expansive motion, as if in the last extremity they were gasping for breath. It was impossible fairly to com-

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pare the motion to anything else. They evidently possessed the power of changing their form; they would at one time materially elongate, and at another time shorten their bodies. In their vigorous state their movements were very similar to that of a common tadpole.

In the fluid of this case there were likewise a few blood globules, transparent cysts, and small granular bodies; also portions of epithelium, or what very much resembled it.

The 3rd case occurred in a man, of the age of 65, one of my hospital patients, and in whom the disease had existed for about twelve months. It commenced immediately after the testicle had been violently squeezed by an enraged and drunken man who was fighting with another, and whom my patient was endeavouring to separate.

The situation of the fluid appeared to be very much that of common hydrocele of the tunica vaginalis, and after the operation had been performed there was nothing peculiar to be observed in the testicle or its appendages. There were about four ounces of fluid abstracted, which was of paler colour than is usual in hydrocele, and displayed very much the appearance described by Mr. Liston as exhibited by the fluid of the encysted hydrocele, in which he had discovered spermatozoa. But in one respect it differed from that, as it contained a considerable quantity of albumen. There was also found in it much saline matter; but the precise nature and proportions of which were not ascertained. The

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spermatozoa met with in the fluid were very numerous, and were seen in a living state, not only by myself, but also by Mr. F. Wood, surgeon, of Brownlow Street, and Mr. John Quekett, of the College of Surgeons.

In this, as in the former cases, the fluid contained a few blood globules, transparent cysts, spermatic granules, and scales of epithelium.

This patient has been tapped a second time, and the fluid presented the same appearances as on the first occasion. It was examined, not only by myself, but also by Drs. Burrows and Russell, as well as by Messrs. Lawrence, Stanley, Paget, &c.

At present I am unacquainted with any facts that will satisfactorily account for the circumstances under which the spermatozoa in the preceding cases departed from their natural abode, and acquired a "local habitation" in the situation in which they were discovered; but the probability is, that the cases will be presented to me again, when I shall have an opportunity of further investigating the matter.

It may, however, be as well to state here, that the testicle having been wounded in the operation, would in no way explain the fact, for spermatozoa fully formed, and in an active state, are rarely met with in the human testis, and even in the epididymis or vas deferens there never exist, *at one time*, as far as I have had opportunities of judging, sufficient spermatozoa to yield anything like the vast number that were present in the cases of hydrocele adduced

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above. In two cases of abscess communicating with the epididymis, which I have had under my observation lately, one of them a patient of Mr. Lawrence, in St. Bartholomew's Hospital, there have passed off very few spermatozoa. Spermatic granules have come away in great number.

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STATISTICS

OF

BETHLEM HOSPITAL,

WITH

REMARKS ON INSANITY.

By JOHN WEBSTER, M.D.,

CONSULTING PHYSICIAN TO ST. GEORGE'S AND ST. JAMES'S DISPENSARY, &c.

READ JUNE 27TH, 1843.

THE subject of insanity, at all times an interesting matter of inquiry to medical men, has of late engaged so much attention, and there prevails such a general desire for information respecting the disease, especially when any additional facts are brought forward in its illustration, that I am led to believe a statistical report of the principal occurrences met with at Bethlem Hospital, during the last and present century, may be of some use, particularly if the tables are so arranged as to give as well the number of admissions as the deaths, and the proportion of patients reported cured, during different periods, but of the same comparative duration. These classified statements are accompanied by a few general remarks on insanity; and, lastly, an account is

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given of the chief pathological changes of structure observed on the dissection of seventy-two insane patients which have been recently performed in that hospital.

Tabular documents of the kind alluded to, when obtained from authentic sources, cannot prove otherwise than useful; and as the records of the above institution are replete with valuable information, I have thought it might be advantageous to lay the present communication before the Royal Medical and Chirurgical Society, where I trust it will be received, not as a paper containing much that is new upon the subject under discussion, but rather as an attempt to contribute a few data respecting the prevalence of insanity in the metropolis, its curability, and pathology; believing that the facts stated will assist, as well those actually engaged in the study and treatment of mental diseases, as also the investigations of physicians only taking a general interest in questions of that description.

With the view of promoting these objects, I would therefore beg to bring under the notice of the Fellows several tables recently compiled from the registers kept at Bethlem Hospital. Before, however, doing so, it is but just towards Mr. Nicholls, the present efficient Steward of the establishment, to state, that I have received great assistance from that officer, when drawing up the tables accompanying the statements, upon which many of the deductions in the present paper are virtually founded. Indeed, without his co-operation in supplying the requisite official

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returns, I should scarcely have been able to accomplish the task I have now undertaken, which I fear may still seem somewhat diffuse, from the different numerical calculations it contains.

According to the ancient records fortunately still preserved in the archives of Bethlem Hospital, it appears that 22,897 insane patients, exclusive of incurable and criminal lunatics, have been admitted into the above asylum since the year 1683. But as it would prove tedious, if not superfluous, to include so extensive a field of inquiry in the present remarks, they will be confined to the detail of the principal occurrences met with in that charity during the last hundred years. In pursuing this investigation, the number of patients received into Bethlem Hospital, with the total amount of cures, and the actual deaths reported, as also the per centage calculated on each, will be enumerated under separate heads; embracing, however, different periods of twenty years in each division; the first commencing the 1st of January, 1743, and the last terminating the 31st of December, 1842. It is, nevertheless, right to mention, that, owing to defects in some of the official registers of the institution, the exact number of patients discharged cured from Old Bedlam, and the amount of deaths which took place in one or two of the years prior to 1748, could not be accurately ascertained, and are therefore given from a comparison with the results of subsequent years. Still, the number of admissions reported are correct, as well as every other particular in these tables;

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and as the returns are all taken from authentic public documents, and drawn up without reference to any preconceived theory, they become the more valuable.

Table exhibiting the Total Number of Lunatic Patients admitted into Bethlem Hospital, discharged cured, or died, during five different periods of twenty years each, ending the 31st December respectively.

In 20 Years, ending	Number Admitted.	Number Cured.	Number Died.
1762	3,286	1,069 or 32¼ per cent.	714 or 21⅘ per cent.
1782	3,945	1,366 or 34⅔ per cent.	560 or 13⅓ per cent.
1802	3,906	1,379 or 35⅓ per cent.	203 or 5⅕ per cent.
1822	2,149	892 or 41½ per cent.	111 or 5⅙ per cent.
1842	4,404	2,269 or 51½ per cent.	224 or 5$\frac{1}{14}$ per cent.
Totals . .	17,690	6,975 or 39⅓ per cent.	1,812 or 10¼ per cent.

By the preceding statement, the number of insane patients received into Bethlem Hospital during the latter half of the eighteenth century appears to have varied very little from the previous average, although, during the early part of the present century, the actual numbers admitted, from various causes, which it is now unnecessary to particularize, indicate a material diminution; in fact, the total admissions during the twenty years ending the 31st December, 1822, scarcely exceed half the amount of patients treated in Bethlem Hospital during the same series of years immediately preceding; whilst the aggre-

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gate number of curable lunatics received into that charity, for the twenty years terminating the 31st December, 1842, was more than doubled; being 4,404 in the latter, and only 2,149 in the former period. Nevertheless, this remarkable decrease in the amount of insane patients admitted at this asylum, during the early part of the current century, compared with the number received during the last, and also the twenty years just terminated, was temporary, and confined to this institution; since, at the time when this considerable defalcation in the admissions was noticed at Bethlem Hospital, so great an increase, compared with the amount of insane patients previously received into the wards of St. Luke's, then took place, that the augmented number at the latter, almost counterbalance the decrease reported at the former institution.

According to an authentic statement now in my possession, the total number of lunatic patients received into St. Luke's Hospital for the twenty years ending the 31st December, 1802, appears to have been 3,987, whilst the admissions increased to 5,346 during the twenty years ending the 31st December, 1822; although from that date to the 31st December, 1842, they again fell to 4,044. From these varied and conclusive facts, it cannot therefore be asserted, that mental alienation prevailed less frequently in London, during the early part of the present century than it did previously, or has done more recently; notwithstanding fewer insane patients were admitted into the most extensive of

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the only two public lunatic asylums situated in the metropolis.

The uniformly increasing proportion of patients discharged cured from Bethlem Hospital, as well as the diminished ratio of mortality likewise met with in cases of mental disease in that establishment, are points which well deserve attention; more particularly, as it appears by the above tables, that the annual amount of cures have not only steadily advanced, but the comparative number of deaths reported have also remarkably diminished, since the middle of the last century. For instance, the ratio of recoveries during the first twenty years embraced in the preceding statement, was only $32\frac{1}{4}$ per cent. on the admissions, whilst it rose to $51\frac{1}{2}$ in every hundred patients admitted during a similar number of years ending the 31st December, 1842; at the same time that the amount of deaths actually decreased from $21\frac{2}{8}$ per cent. to $5\frac{1}{14}$ per cent., or less than one-fourth the previous average, after an interval of nearly a century. The difference will, however, appear even more marked, when the results met with during three years in the middle of the last century, are compared with similar results reported to have occurred in the three years just terminated. In illustration of this point, it is only necessary to refer to the official tables already quoted, which show that the number of insane patients received into Bethlem Hospital, discharged cured, or died, during the specified period, were as follows:—

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ADMITTED.		CURED.	DIED.
In 1750–51–52	462	145 or 31½ per cent.	118 or 25½ per cent.
In 1840–41–42	897	492 or near 55 per cent.	51 or 5¾ per cent.

Connected with this important question respecting the results met with in cases of insanity, it is proper to mention that the rate of mortality among the patients treated at Old Bethlem Hospital was so considerable during the year 1753 as to exceed the total number of recoveries, the former being fifty, whilst only forty-three patients were actually discharged cured; and as the admissions in that year amounted to 150, the recoveries were consequently at the rate of 28⅔ per cent., whilst the deaths rose so high as 33⅓ per cent., being exactly one-third the number of admissions. This very unusual mortality was, however, not altogether owing to insanity, since small-pox then prevailed among the patients, as it likewise did in 1770, when the number of deaths and recoveries were equal, each being 60 to 213 admissions; that is, 28 per cent. for both.

Mental diseases, as physicians well know, are much more prevalent in this country among women than men. With the view of showing that this opinion is correct, and likewise to point out the comparative difference in the results usually following attacks of insanity when affecting the two sexes, I would next refer to the subjoined table of curable patients admitted into Bethlem Hospital during the last twenty years, ending the 31st December,

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1842. In that statement, the admissions, the amount of cures, as well as the number of deaths reported in each sex may be thus separately classified.

ADMITTED.		CURED.		DIED.	
M.	F.	M.	F.	M.	F.
1,782	2,622	823	1,446	112	112
or		or	or	or	or
47 per cent. more females than males.		46⅕ per cent.	55⅕ per cent.	6¼ per cent.	4¼ per cent.

Reasoning from these facts, no doubt can exist regarding the greater frequency of mental alienation among females than males; indeed, the excess of insane women admitted at Bethlem Hospital is shown to have been 47 per cent., and as the same facilities regarding the admission of patients into that institution prevail, without any reference to sex, provided the cases are recent, the above results must be considered conclusive. A similar opinion is likewise fully borne out by the number of insane patients of each sex admitted into St. Luke's Hospital, during the same period of twenty years, to which reference has just been made. By returns obtained through the kindness of a friend, it appears that 1,734 lunatic male patients were received into the wards of that charity, from the 31st December 1822, to the 31st December 1842; whilst the number of insane females admitted during the same period, amounted to 2,310, or 33⅓ per cent. more of the latter than the former sex. According to these data, derived from the only two public institu-

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tions for the insane in London, and therefore the best guides to follow in making any calculations upon the subject, it may be stated that mental affections are much more frequently met with among women than men, at least in this part of the empire; where, speaking generally, the difference amounts to about 35 or 40 per cent. at an ordinary estimate.

But this greater liability of females than males to diseases of the mind, is at the same time accompanied by other peculiarities worthy of notice; since it is shown by these tables, that mania is not only a more common complaint, but more curable, and proves less fatal to women than to men. This conclusion is confirmed by the facts stated in the accompanying tables, which indicate, that the ratio of recoveries from attacks of insanity was nine per cent. in female more than in male patients; whilst in the latter sex, the number of deaths exceeded by two per cent., the rate of mortality met with in the former.

Besides, it is curious to find the same conclusions borne out by the results met with among the insane patients classed as incurable. Thus, on that list, 70 male, and 80 female lunatics were admitted into Bethlem Hospital, during the twenty years ending the 31st of last December, and although all were considered confirmed maniacs at the time of their reception, 18 women were actually discharged cured, whilst only six men in the same class of patients left the house convalescent. The results being, that 22½ per cent. of the incurable female patients

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recovered, and only $8\frac{4}{7}$ per cent. of the male lunatics similarly affected. It is also interesting to mention, that the average deaths were even less numerous among the incurable women than men, of whom 31 patients died, being at the rate of $44\frac{1}{3}$ per cent.; whilst among the incurable females, 34 died, or $42\frac{1}{2}$ per cent. upon the admissions. From which data it consequently appears, that among 100 incurable female lunatics similarly affected, there were two deaths less than among the same number of incurable male patients.

An interesting, although somewhat speculative deduction, respecting the comparative influence of mental diseases upon the two sexes might be fairly drawn from the various facts stated in the previous pages, namely, if a similar proportion of the female patients had died, which actually occurred among the male lunatics admitted into Bethlem hospital, there would have been an increase of 53 deaths among the former sex, beyond the number reported, thereby augmenting the total to 165, instead of 112 which actually happened. Besides, it may be remarked, had the proportion of recoveries been likewise the same among the female lunatics, as on the male side, there would have been 235 fewer patients discharged cured; which diminution, if added to the 53 calculated deaths, gives an aggregate of 288 individuals, or near 10 per cent. on the total admissions, who then would either have died, or continued the victims of mental alienation.

These remarkable coincidences in the results met

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with, both among the incurable, as well as the curable patients admitted into Bethlem hospital, deserve attention, as they completely substantiate the opinions previously expressed respecting the greater frequency and curability of insanity, when that disease attacks women, than occurs when men are its victims; consequently, any prognosis which the physician may be required to give in a case of mania, may be, *cæteris paribus*, of a more favourable character, if the patient affected is a female, than in a case of the same complaint when an insane man is the subject of this disease; particularly as the deductions which the practitioner may now reasonably form, instead of being supported by a limited number of facts, appear proved by the results uniformly met with during a long series of years, and by tables comprehending many hundred patients of both sexes, affected with insanity, treated at an extensive metropolitan lunatic establishment.

The propensity to commit suicide, unfortunately, appears so prevalent a feature in cases of mania, that the attendants upon insane patients cannot be too careful with those showing any symptoms of the kind, lest such a calamitous event should supervene. However, on this particular point, it is very satisfactory to know, that instances of self-destruction are now much less frequently met with in public institutions for the insane than formerly; notwithstanding the fact that patients enjoy at present greater freedom, are more frequently engaged in varied occupations, and even sometimes are allowed

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to use dangerous tools in their respective handicrafts, than in the olden time, when restraint and coercion were more commonly employed. In those days of darkness, when confinement in cells, chains, and personal punishments, were often used even as ordinary means of management in cases of lunacy, suicides were more frequent among the insane patients of Bethlem Hospital than at the present day, when a more humane, and much better mode of treatment is happily pursued.

On this point, some interesting information may be obtained from the registers of the hospital alluded to; in which it is stated that suicides were more common in that charity during the last, than they have been in the present century. By these records it appears that 18 cases of self-destruction occurred in old Bedlam, from the 1st of January 1750, to the 1st of January 1770, six being male patients, and twelve female; and as the total number of lunatics admitted into that hospital, during the above period, amounted to 3,629 patients, there consequently occurred one suicide in about every 202 admissions. Now, however, although restraint, instead of being the rule, as formerly, constitutes a rare exception, whilst the insane patients are otherwise treated in a very different manner, compared with the ancient régime, it is gratifying to state, that the proportion of suicides has very much diminished. For example, during the twenty years ending the 31st of December 1842, notwithstanding the total admissions, including 150 incurable, and 122 criminal

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lunatics, amounted to 4,676, only five suicides occurred in this royal hospital; which gives one case in every 925 insane patients admitted, or less than one-fourth the average number met with among the lunatics confined in old Bedlam, during the middle of the eighteenth century. It is also worthy of notice, that all the five examples now alluded to were women, which rather singular circumstance, coupled with the previous remarks respecting the suicides reported in the middle of the last century, clearly indicates that a greater propensity to the crime of self-murder prevails in female than in male lunatics.

Another peculiarity may be also mentioned, in order to show that restraint and the strict confinement of lunatic patients do not always insure additional security to the victims of insanity, but even the contrary. According to the records of the charity, notwithstanding the different means taken to secure the patients, more lunatics formerly escaped from old Bedlam, than in the present day, when the straitwaistcoat is almost unknown, and the treatment adopted is quite different. By the registers of the Institution, it appears, that during the 20 years ending the 1st of January 1770, to use the expressive words met with in these official documents, 44 male and 11 female lunatics actually "ran away" from the hospital, during that period; being one escape in every 66 patients admitted. Compared with the above authentic statement, it is very satisfactory to learn, that the number of lunatics reported to have

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escaped from this establishment during the twenty years ending the 31st December 1842, were 11 men and 5 women, being only one evasion in every 292 admissions, or less than one-fourth the previous amount. Considering however, that as 14 of the patients who escaped were afterwards brought back to the hospital, in reality, only two lunatics permanently succeeded in their attempt; which makes the account to be very different from that just given of similar events met with in the middle of the last century.

From the preceding statement, it is therefore conclusively proved that a stronger disposition to escape from the confinement to which lunatics were formerly subjected in this asylum, prevailed among the male than the female patients, although the latter class were the most numerous; whilst the propensity to commit suicide, according to the same evidence, was just the reverse. These conclusions are interesting; and seeing they are not peculiar to any particular period, but the uniform results met with in this asylum, during a long series of years, and are obtained from a large number of insane persons of both sexes placed under similar circumstances, they must be considered as correct; and consequently deserving attention from the philanthropist and the physician, when directing the treatment adapted to patients afflicted with that greatest of all human calamities, mental alienation.

As the influence which insanity exerts upon the longevity of its victims is also a question of con-

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siderable interest to all classes, the subject merits some remark on the present occasion; especially, with reference to the number of years which a lunatic may continue to perform all the functions of animal life, notwithstanding his intellectual faculties are either totally lost, or placed as it were in abeyance. That individuals may live a long time after becoming confirmed lunatics is so well known that the fact does not require much additional proof; however, it is worth mentioning, that insane females are more likely to attain old age, although their mental disease may be considered incurable, than male lunatics placed under similar circumstances; provided the present state of the incurable list of patients at Bethlem Hospital is considered any authority. For example, among the incurable men now in that establishment, seven were inmates prior to 1830, and have been so ever since; whilst on the female side, seventeen incurable patients come within a similar category. Of the latter sex, one patient has continued insane upwards of fifty years; forty-nine of which she has constantly passed in Bethlem Hospital; another female lunatic has been insane for forty-five years, and an inmate of the charity during thirty-six; and a third individual belonging to the same class has been in the asylum during thirty-eight years, having lost her reason a year before. On the other hand, although the results met with among the incurable male lunatics are somewhat different, the facts nevertheless show, that the opinion previously expressed respecting the

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patients' prospect of longevity, notwithstanding the existence of insanity, is supported by ample experience. Thus, of the seven male lunatics reported insane previous to 1830, one has been an inmate of Bethlem Hospital during forty-three years, another thirty-eight, and a third for the same period; but respecting the length of time they have been actually insane, the registers are silent. From these data, it may very fairly be assumed, that in most cases the expectation of life is greater among incurable female lunatics, *cæteris paribus*, than among male patients; although the mental disease of the patient has actually assumed a confirmed character.

The pathology of insanity has long occupied the attention of physicians; and however much has been recently effected in this department of medical science, especially by the French pathologists, many points connected with the subject yet require further elucidation. Considering therefore, that any facts which illustrate the nature, or may explain the effects of mental diseases, to be intimately connected with the present inquiry, I trust it is unnecessary to apologize to the Society whilst occupying their attention for a little time, with some practical details on so important a subject as the pathology of mania; particularly as the recent records kept at Bethlem Hospital supply considerable information respecting the diseased alterations of structure usually met with in cases of that complaint.

As it is now customary to examine the bodies of

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most of the insane patients who die in Bethlem Hospital, as well as to preserve an account of the pathological appearances observed in each case, and especially, as the dissections were all made by Mr. Lawrence, the present distinguished surgeon of that charity, the autopsies therefore possess more than an ordinary value, consequently any record of them deserves publication. To avoid being tedious, and also to render the description of the pathological appearances recorded in so many cases, as short as possible, consistent with clearness, I have drawn up a synopsis of seventy-two dissections of lunatic patients which have been recently made at that institution by the above eminent anatomist and physiologist.

Considering it would be incompatible with the chief object proposed in this paper, to describe the symptoms characterising the mental disease of the numerous cases in which the pathological appearances met with after death are subjoined, I have not entered upon that part of the subject; particularly, as any attempt of the kind would have been imperfect, unless the present observations were extended much beyond all reasonable length. Unwilling to occupy the time of the Society with so many details, the previous histories of the patients alluded to are therefore wholly omitted.

Before making the proposed synopsis, I of course applied to Mr. Lawrence, for permission to use the excellent reports he had written in the register of autop-

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sies, seeing they constituted the ground-work of the summary compiled in these pages. As I expected, that gentleman, with the greatest liberality, kindly replied to my request, " It will give me pleasure, if you should find the facts I have observed and collected, available in illustrating the observations you intend to offer to the Society." Having obtained such authority, I felt little hesitation, either in drawing largely from this valuable repertory of pathological knowledge, or in now laying the following details before the Society.

Synopsis of the Principal Pathological Appearances met with in 72 Insane Patients examined at Bethlem Hospital, since the 1st January 1837, *by William Lawrence, Esq.*, F.R.S., &c.

No.	Sex.	Head.	Chest.	Abdomen.
1	Fem.	Blood-vessels of brain and membranes turgid.	About a pint of bloody fluid in right pleura; a small quantity of similar fluid in left. Lungs partially connected to chest by old and very firm adhesions. Lining membrane of trachea and bronchi dark coloured from vascular congestion. Blood-vessels of lungs somewhat turgid.	Liver pale, its external covering somewhat thickened, and opaque at one part, as if from previous inflammation. N.B.—Body very fat.
2	Male	Blood-vessels of brain and membranes turgid. Cellular texture of pia mater slightly infiltrated with serum, an increased quantity of fluid in lateral ventricles.	Lungs did not collapse. Marks of recent and violent inflammation in left pleura; copious effusion of soft yellow lymph covering surface of lung, in two situations; and also on the corresponding part of chest. Lung agglutinated to pleura costalis for rest of extent. Anterior lobe of lung solid by previous inflammation, and sank in water. Blood-vessels of other lobe very turgid. Mucous membrane of trachea and bronchi of a deep red colour throughout.	

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No.	Sex.	Head.	Chest.	Abdomen.
3	Male	Blood-vessels of head loaded with blood, of which a large quantity flowed out on dividing integuments and sawing bone. Those of brain and membranes very turgid throughout. Cellular texture of pia mater slightly infiltrated; substance of brain firm and healthy throughout; and a considerable quantity of fluid in base of skull when brain was removed.	Lungs did not collapse, but quite healthy. Lining membrane of trachea and bronchi deep red colour; these tubes filled with mucus. Right cavities of heart, especially the auricle, loaded with coagula of blood.	Contents of abdomen healthy.
4	Male	Arachnoid coat somewhat thickened and opaque; pia mater considerably infiltrated over cerebral hemispheres; lateral ventricles enlarged and filled with transparent fluid; and a considerable quantity of fluid remained in base of skull, after brain was removed. Substance of brain healthy.		
5	Male	Vessels of brain loaded with blood; slight serous infiltration of pia mater; increased quantity of fluid in ventricles and about basis of brain.	Lungs did not collapse, and inadherent; blood-vessels filled with blood. Lining membrane of trachea and bronchi intensely red throughout, and all the air passages filled with frothy mucus.	
6	Male	Thickening and opacity of arachnoid coat over whole extent of cerebral hemispheres; considerable serous infiltration of pia mater; increased effusion of water into lateral ventricles, and much fluid at basis of skull after brain was removed.	Recent inflammation of right pleura, and agglutination of lung to pleura costalis; firm old adhesion of same lung at back part; cellular texture of anterior mediastinum and adjacent part of each pleura, infiltrated with reddish and extremely fetid pus Pleura costalis of left side thickened, and lung unusually and strongly adherent consolidated at various parts, with depositions of fetid matter in different situations.	
7	Male	All the vessels on inside of head loaded with blood, particularly in substance of brain, with numerous and large bloody points on cut surface; arachnoid coat opaque and thickened; copious infiltration of pia mater; an unusual quantity of fluid in ventricles, and much fluid in basis of skull after brain was removed.	Right lung inflamed; a considerable portion of posterior and inferior lobes consolidated and impervious to air, so that it sank in water. The inflammation was in an active state, and apparently extending.	

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No.	Sex.	Head.	Chest.	Abdomen.
8	Fem.	All the vessels of head loaded with blood, of which a large quantity escaped during the examination. Slight serous infiltration of pia mater; considerable effusion of serum into ventricles.	All parts loaded with fat. Indeed, the body generally was excessively fat; and the depth of the adipose structure in the line of incision, from the sternum to the pubes, varied from two to three inches.	A diseased mass, larger than the fist, occupied the upper part of pelvis: it consisted of several firm fleshy tubercles growing from the uterus. All parts loaded with fat.
9	Male	Vessels in the head rather turgid; slight serous infiltration of pia mater on convexities of cerebral hemispheres.	Left lung, excepting a small slip in its anterior portion, consolidated and sank in water. Right lung universally adherent, but healthy.	Body was emaciated, and the viscera entirely free from fat.
10	Fem.	Internal vessels of head turgid; serous infiltration of pia mater; numerous bloody points everywhere on cut surface of brain; slight pink discolouration of medullary substance, of small extent, in two or three places; slight ecchymosed appearance of pia mater on surface of right posterior lobe opposite lambdoid suture. Substance of brain softened, and accompanied with slight discolouration of a light brown tint, affecting both cortical and medullary substances to the size of a large walnut; coagulated blood as large as a filbert lodged in substance of brain, on superior surface of left posterior lobe under pia mater. The cornea of both eyes destroyed by ulceration; edge of aperture had a sloughy appearance, and a bloody fluid issued.	Chest badly formed, sternum and ribs projecting considerably, so as to produce the configuration called "pigeon breast." Lungs extensively connected to containing cavity on both sides by old adhesions. In anterior part of right lung, there were three or four large bladders produced by enlargement of air cells. Posterior portion of same lung partially consolidated, and extremely turgid with blood.	Body was emaciated, and the contents of the belly were completely free from fat.
11	Male	Internal vessels extremely turgid; those of pia mater, and in substance of encephalon, injected to minutest branches; bloody pores unusually numerous and large on cut surface of brain, substance firm; iij oz. of clear fluid in each lateral ventricle.	Contents free from disease.	All the organs healthy.
12	Fem.	A few slight effusions of blood on inner surface of dura mater; vessels of brain turgid; serous infiltration of pia mater; about ij oz. of clear colourless fluid in each lateral ventricle; an ecchymosis, the size of a horse bean, in roof of right lateral ventricle. Much fluid in basis of skull after brain was removed.	Old adhesions of right lung extensive and firm; less extensive, but recent adhesions of left lung: large portions of latter were consolidated, with suppurated cavities in consolidated parts.	Numerous adhesions of liver to abdominal parieties and to the other viscera. N.B. — Cellular substance generally anasarcous: the muscles shrunk and flabby.

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No.	Sex.	Head.	Chest.	Abdomen.
13	Male	Remarkable turgidity of all the blood-vessels, especially of those in substance of brain; superior longitudinal sinus filled with a coagulum like a recent clot; its interior, at two or three points, contained a dull reddish brown fluid like pus. About the middle of each hemisphere, a large vein greatly distended, and filled with a firm coagulum, presented some points filled with a similar fluid; other veins of hemispheres filled with firm coagulum. Near vein first mentioned, a considerable ecchymosis of pia mater, with slight serous infiltration.	Firm adhesion of right lung, at upper and back part; large abscess in adherent portion surrounded by considerable consolidation of pulmonary substance, abscess contained iij or iv. oz. of thick matter. Another portion of lung consolidated, presenting on a section deposits of grey tuberculous matter, and two or three small vomicæ.	Contents free from disease, and the fat had been absorbed from viscera. N.B.—Body emaciated.
14	Male	Blood-vessels of the head somewhat turgid, slight serous infiltration of pia mater.	Nearly the entire right lung consolidated, with tuberculous depositions of various sizes, and several purulent excavations. A similar change in several small spots of left lung.	N.B.—Body emaciated, and quite free from fat, internally as well as externally.
15	Fem.	No deviation from the normal condition of the brain and membranes, excepting congestion of the blood-vessels, both on the exterior and interior.	Right lung connected to chest by firm and general adhesions. Left lung inadherent, but two thirds of posterior part hepatized and so dense, that it sank in water to the bottom of vessel. Small bony masses like those in abdomen also met with under pleura of left lung.	Liver connected by old and general adhesions to diaphragm above, and to the adjacent organs below. On surface of mesentery of the large and small intestines, immediately under peritoneum, small masses of bone were irregularly scattered, white, tolerably smooth, and varying in size from a pin's head to a pea. Ovaries were the size of a walnut, firmly adherent to adjacent parts. Uterus very small.
16	Fem.	Vessels of brain and membranes loaded with blood to their minutest ramifications. Numerous bloody points wherever brain was cut into; a little serous infiltration of pia mater of cerebral hemispheres.	Large part of left lung partially consolidated. Trachea and bronchi filled with frothy mucus.	No morbid appearances were observed in the abdomen.
17	Fem.	Little if any moisture between dura mater and surface of brain; consequently, membrane closely applied to the parts within. Convolu-	Both lungs universally and firmly adherent to chest. Left lung extensively tuberculated. A few tubercles also in right lung.	The abdominal viscera healthy.

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No.	Sex.	Head.	Chest.	Abdomen.
		tions of hemispheres flattened. Blood-vessels of brain empty; cortical matter light coloured, and the medullary substance was of a pure white. About iij oz. of clear watery fluid in each ventricle, and considerable effusion of same fluid at basis of brain.		
18	Male	Arachnoid coat thickened and opaque, particularly over cerebral hemispheres. Considerable serous infiltration of pia mater in same situation. Lateral ventricles enlarged, and filled with colourless transparent fluid, about iij oz. in each. Much fluid in basis cranii.	Contents healthy.	Viscera healthy. N.B. — Body emaciated.
19	Male	Vessels of head both internal and external loaded with blood, and a large quantity flowed out during the examination; numerous and large bloody points observed everywhere in cutting substance of brain, about iij oz. of colourless transparent fluid in each lateral ventricle. Convolutions of cerebral hemispheres partially flattened, as if contents of cranium had been subjected to pressure before death. Pineal gland converted into a cyst, the size of a large pea, containing watery fluid.	Contents perfectly healthy.	Viscera healthy. N.B.—Body fat.
20	Fem.	Vessels within the head somewhat turgid, especially those in substance of brain; slight serous infiltration of pia mater covering cerebral hemispheres.	A small portion of left lung condensed.	No alteration of structure in the viscera. N.B. — Body emaciated both externally and internally.
21	Male	Blood-vessels of brain and membranes turgid; numerous bloody points in every situation of cut surface of brain. The arachnoid coat thickened and partially opaque, especially along edges of fissure between the cerebral hemispheres. Cellular substance of pia mater on hemispheres considerably infiltrated.	Left lung closely adherent to chest at upper and back part. A small vomica in substance of lung at this spot, pulmonary texture around it condensed; the lung, although inadherent, did not collapse when chest was opened. Right lung connected throughout to chest, by firm old adhesions. A bronchial gland at bifurcation of trachea was converted into a hard tumour as large as a middle sized orange, being	Abdomen contained a little serous fluid, but the viscera were healthy.

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No.	Sex.	Head.	Chest.	Abdomen.
			principally a cyst filled with matter like putty in colour and consistence. Similar deposits, but smaller, in one or two other bronchial glands. Lining membrane of trachea, bronchi, and ramifications, bright red, and covered with a thick yellow secretion nearly filling several of the tubes. Heart rather large.	
22	Male	Vessels of brain and membranes turgid with blood; those of cerebral substance so full, that the medullary matter had a faint tinge of pink colour. Pia mater infiltrated with serous fluid. Brain particularly firm throughout.	Right lung universally and closely connected to cavity of chest by old adhesions. There had been recent inflammation of pleura and right lung. Lung everywhere agglutinated to surface of cavity, and soft yellow lymph effused in several places of pulmonary pleura in some quantity. Substance of lung inflamed, and part of it so far condensed as to sink in water. Mucous membrane of trachea and ramifications dark red, covered by copious thick yellow discharge. A scirrhous tumour, about an inch immediately above the bifurcation of trachea on outside, with a similar formation on the interior, which contracted the tube to the size of a writing-quill. This new production resembled the scirrhus which precedes cancerous ulceration. Two or three absorbent glands found near this swelling were indurated, but not enlarged.	Liver and arch of colon, particularly the former, were connected to peritoneum lining cavity, by numerous old adhesions, principally in the form of long, slender, but firm threads.
23	Male	Blood-vessels of brain and membranes generally injected, and sections of former presented everywhere the bloody dotted appearances in a high degree; very slight serous infiltration of pia mater covering cerebral hemispheres.	Lungs connected to chest by old strong adhesions; mucous membrane of trachea, bronchi, and ramifications, deep livid red throughout; minute branches and air-cells loaded with a thin frothy fluid, which issued in great quantity wherever the substance was cut into. Bronchial glands enlarged and indurated, containing several small depositions of yellowish white cheesy matter. A lymphatic gland by the side of trachea inflamed, and contained a deposit of pus, about the size of a large pea.	

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No.	Sex.	Head.	Chest.	Abdomen.
24	Male	Blood-vessels of brain and membranes turgid; the former particularly distended, so that the medullary substance appeared everywhere unusually vascular; cut surfaces of brain covered with large and numerous dots of blood; when scraped away, orifices of vessels appeared large and numerous. Arachnoid coat on cerebral hemispheres opaque and thickened; considerable serous infiltration into cellular texture of pia mater, and much fluid on basis of skull after brain was removed.	Contents healthy.	Viscera healthy.
25	Male	Blood-vessels of brain and membranes rather empty; cellular membrane of pia mater covering cerebral hemispheres greatly infiltrated: v or vj oz. of clear transparent fluid in lateral ventricles, and much fluid also in basis of skull. A few convolutions of cerebral hemispheres slightly shrunk. Pineal gland converted into a thin cyst, equal in size to a horse-bean, containing a clear light yellow fluid.	Caries of sternum with an abscess; and the inflammation had extended to anterior mediastinum. Pericardium also inflamed. Right bag of pleura connected to the sternum, and adhered firmly, on the inside, to the lung. Right lung connected to pleura by extensive old adhesions; tuberculated, and contained a vomica about the size of an ordinary orange. A portion of right lung red and indurated. A pint of fluid in left pleura; old adhesions of left lung, and on its surface there was the appearance of an indurated depressed cicatrix; substance of lung was here blackish, hard, and contained small deposits of a greyish cheesy matter. Heart enlarged much beyond its natural size.	Contents healthy.
26	Fem.	Vessels of brain and membranes loaded with blood, slight infiltration of pia mater, a little fluid in basis of skull after removal of brain.	Cavities of heart filled with blood, particularly on right side; otherwise, all the organs free from disease.	A corpus luteum in right ovary. Uterus beyond its virgin size; contained no ovum, but there was a little coagulated blood and mucus in its cavity. Other organs healthy.
27	Fem.	Vessels of brain and membranes extremely turgid; very numerous bloody spots everywhere on cut surfaces of brain; a small diffused coagulum of blood, about 4 or 6 drops, on internal	No disease observed in any of the organs.	An appearance, considered a corpus luteum, in one of the ovaries. Uterus enlarged beyond its virgin size. All the other viscera healthy.

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No.	Sex.	Head.	Chest.	Abdomen.
		surface of dura mater, over left cerebral hemisphere. Pia mater covering cerebral hemispheres considerably infiltrated with serum; increased quantity of serum effused in lateral ventricles.		
28	Male	A large quantity of blood escaped on detaching scalp and opening skull; vessels of brain rather turgid; partial infiltration of pia mater.	Left lung connected to chest by strong general adhesions, firm, and of a dull red colour; greater portion of lung consolidated; vessels turgid, and air-tubes loaded with frothy mucus. Right lung inadherent, did not collapse, and was condensed in several portions; surface of lung deep red, blood-vessels turgid, and air-cells filled with thick mucus.	Viscera healthy.
29	Fem.	Blood-vessels of brain and membranes turgid; those of former part numerous and large, wherever incisions were made into its substance; considerable serous infiltration of pia mater; slight effusion into the ventricles.	Right lung connected to cavity of chest by general old adhesions. A few adhesions, also, existed in the left side. Other contents healthy.	Viscera free from disease.
30	Fem.	Blood-vessels of brain and immediately investing membranes extremely turgid; bloody points very numerous on cut surfaces of brain; medullary matter, here and there, had a light violet tint. Brain tumid, and dura mater distended, which adhered slightly to cerebral surface; no intervening fluid; convolutions partially flattened; substance of brain firm.	A pint and a half of darkish, turbid, and most offensive fluid in left cavity of pleura. Posterior lobe of left lung congested, condensed, and of a dull red colour, with depositions of a yellow substance dispersed through its substance; inferior edge mortified, of a dusky brownish hue, and of a soft semi-fluid consistence.	Contents healthy.
31	Male	Blood-vessels of brain and membranes turgid; numerous bloody points on cut cerebral substance, and medullary matter, at various points, had a faint violet tint; slight serous infiltration of pia mater in cerebral hemispheres; i oz. of clear fluid in each lateral ventricle.	Lungs did not collapse, partially connected to chest at back part by strong old adhesions; both loaded with fluids, which issued in the greatest abundance on cutting into substance of lungs, which were of a deep livid red, on posterior part; small abscess in the dorsal part of right lung; lining membrane of trachea and bronchi deep red; air passages filled with frothy mucus.	Viscera healthy.
32	Fem.	Blood-vessels of brain and membranes turgid; cellular texture of pia mater, on	More than a pint of fluid in right cavity of pleura, rather less in left; right lung con-	A few pints of dropsical fluid in cavity of abdomen.

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No.	Sex.	Head.	Chest.	Abdomen.
		convexities of cerebral hemispheres, turgidly infiltrated; fluid of lateral ventricles somewhat increased in quantity; much fluid in skull, after brain was removed.	nected to chest by partial old adhesions, œdematous; left lung one third its natural dimensions, agglutinated to mediastinum, and covered, as well as surface of cavity generally, by a thick rough coat of lymph. Left ventricle of heart evidently enlarged. Two of the aortic valves partially thickened at loose edge, which formed in each a small irregular excrescence; valves slightly shortened.	N.B.—Lower extremities considerably swelled by anasarcous effusion.
33	Fem.	External vessels of head completely empty; those of brain and membranes extremely turgid. Serous infiltration of pia mater; considerable quantity of fluid in skull, after brain was removed.	Organs healthy.	Viscera free from disease. N.B.—Body considerably emaciated; particularly the upper limbs and trunk.
34	Male	Blood-vessels of brain and membranes turgid; arachnoid coat on cerebral hemispheres considerably thickened and opaque; great infiltration of pia mater, and increased quantity of fluid in ventricles.	Right lung closely and universally connected to parieties of chest by old adhesions; left lung inadherent; a small part of its posterior portion condensed, extremely dark coloured, and full of blood; it sunk in water; slight effusion of lymph in pleura covering lung.	
35	Fem.	Blood-vessels of brain turgid, and numerous bloody spots on cutting into its substance; serous infiltration of pia mater covering cerebral hemispheres; much fluid in basis of skull, after brain was removed.	Both lungs closely and universally connected to thoracic parieties by old adhesions.	Viscera healthy.
36	Male	Blood-vessels of brain and membranes moderately turgid, considerable serous infiltration of pia mater, ij or iij oz. of transparent colourless fluid in lateral ventricles; much fluid in basis of skull, after brain was removed. Pale yellow deposit of cartilaginous firmness, in coats of large arteries, at basis of brain.	Acute inflammation of right pleura, with copious deposition of soft yellow lymph on surface of lung and cavity, in which there was about two pints of turbid yellow fluid. Left lung connected to chest by old adhesions; several ounces of clear yellow fluid in pericardium. Heart considerably enlarged, principally by hypertrophy of left ventricle.	
37	Fem.	A very small extravasation of blood in tract of arteria meningea media on left side of head, between skull and dura mater; all the vessels of brain and membranes extremely turgid; great infil-	Right lung attached to chest by partial old adhesions.	Viscera free from disease.

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No.	Sex.	Head.	Chest.	Abdomen.
		tration of pia mater over whole cerebrum; membranes, when detached from brain, seemed like a sponge soaked in water; i½ oz. of limpid fluid in each lateral ventricle, arachnoid coat partially thickened and opaque near pons varolii; much fluid in skull, after brain was removed.		
38	Fem.	Much blood escaped in dividing soft parts and removing skull-cap, latter deep livid colour; blood-vessels of brain and membranes loaded; convolutions of cerebral hemispheres completely flattened, so that no trace of natural convexity remained. Dura mater in so close contact with its contents as if forcibly squeezed together; no trace of moisture between it and arachnoid coat. Right hemisphere contained in a cavity about iij or iv oz. of coagulated blood; cerebral substance surrounding extravasation soft, and of a light brown colour, for an inch in all directions. Cerebral substance generally softer than usual; septum lucidum lacerated, and lateral ventricle filled with bloody serum and fluid blood.	Left lung adhered universally to chest; other parts free from disease.	Contents healthy. N.B.—The viscera, both of abdomen and chest, were loaded with fat, and there was a thick stratum of fat under the integuments of trunk.
39	Male	Slight effusion of blood between cranium and dura mater, on left side of longitudinal sinus, near parietal bone, where half a teaspoonful of coagulated blood was effused. All the vessels of brain and membranes gorged with blood to utmost extent. Bloody points extremely numerous, whenever cerebral substance was cut; arachnoid coat slightly thickened and opaque over entire cerebrum, and between lobes of cerebellum. Pia mater greatly infiltrated over the whole of both cerebral hemispheres, and was like a sponge soaked in water when detached: ij oz. of limpid fluid in each lateral ventricle; a large	Left ventricle of heart thick and strong, partially hypertrophied.	Viscera healthy—rather fat.

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No.	Sex.	Head.	Chest.	Abdomen.
		quantity of fluid in basis of skull, after brain was removed.		
40	Male	Blood-vessels of brain and membranes rather turgid; slight infiltration of pia mater; slight increase of fluid in ventricles.	Right lung condensed and adherent to mediastinum. Surface of lung and of cavity covered by a thick sheath of lymph. More than a pint of matter in cavity of chest.	
41	Male	Blood-vessels of brain and membranes turgid, those of cerebral substance injected throughout; very slight serous infiltration of pia mater; adhesion of anterior lobes to dura mater, so that small portions of brain stuck to membrane when lobes were removed; cerebral substance at adherent part of a light brownish yellow colour, but not deeper than surface. Dura mater similarly discoloured; slight adhesion of same character between dura mater and right middle lobe; near adherent parts of anterior lobes, cerebral substance was softened, and similar softening of septum lucidum and fornix.	Organs healthy.	Viscera free from disease.
42	Male	Blood-vessels of brain and membranes extremely turgid; Mr. Lawrence says, he never saw those of brain both on surface and in substance more injected with blood; slight infiltration of pia mater.	Pleura on right side of chest acutely inflamed, with large deposit of yellow fibrine both in lung, and on sides of cavity; copious sero-purulent effusion. Substance of lung acutely inflamed, towards front of bright scarlet colour, turgid with blood, thickened and almost black behind. Small portions of substance hepatized in left lung, with slight inflammation of pleura.	
43	Male	Blood-vessels of brain and membranes turgid; arachnoid coat of cerebral hemispheres thickened and slightly opaque; fluid of ventricles somewhat increased in quantity.	Organs healthy.	Viscera free from disease.
44	Male	All the blood-vessels of brain both on surface and in substance extremely turgid; great infiltration of pia mater over whole cerebral hemispheres; membrane thickened, and of a gelatinous appearance, the infil-		

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No.	Sex.	Head.	Chest.	Abdomen.
		trated fluid of aqueous consistence; lateral ventricles enlarged, and filled with transparent fluid; much fluid on basis of skull after brain was removed.		
45	Male	Blood-vessels of brain turgid, particularly in substance; being numerous and large when brain was cut. Arachnoid coat a little thickened and opaque on convexities of cerebral hemispheres; pia mater considerably infiltrated; lateral ventricles enlarged and filled with transparent colourless fluid, much fluid on basis of skull after brain was removed. Arterial trunks at basis of brain thickened and opaque in a few spots; a small irregular deposit of bone with sharp points on inside of frontal bone, to which dura mater adhered firmly; opposite to deposit there was a circular depression of anterior lobe. Convolutions had disappeared in this situation, and depressed part covered by thickened pia mater of a firm fibrous texture. In the anterior lobe there was a cavity the size of a hen's egg, filled with clear transparent fluid. A considerable cicatrix on forehead, with marks of wounds on face, neck, and wrist.	Both lungs connected to chest by old adhesions. The posterior and upper part of each lung so closely and firmly attached, that the substance was lacerated in drawing out contents of the chest. Both lungs tuberculated in upper and posterior part: considerable portion of left lung filled with small tubercles, consolidated, and partially excavated; similar tubercles irregularly scattered through rest of lung which was pervious to air. Back of right lung tuberculated, having small purulent excavations, but disease was less extensive than on opposite side.	Contents healthy.
46	Male	Blood-vessels of brain and membranes moderately turgid; those of former part larger than natural, on cutting cerebral substance.	Right lung connected to chest by firm, old, and general adhesions; greater part of lung hepatized, loaded with blood and other fluids, of a dark brownish livid colour, and so much increased in density as to sink in water. Mitral valve considerably thickened, particularly at its loose edge; chordæ tendineæ thickened and indurated. Valves of aorta similarly changed in structure, and so rigid as to be incapable of closing the mouth of vessel.	
47	Male	Cranium considerably below average adult size, bone thicker than usual, so that skull cap was very heavy.		N.B. — Head, face and front of the body livid and turgid.

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No.	Sex.	Head.	Chest.	Abdomen.
		Cerebrum proportionably small, but cerebellum not at all below its usual dimensions. Anterior cerebral lobes particularly small, and convolutions very narrow. Cerebral substance so firm as to resemble a brain hardened by alcohol or strong acid. Lateral ventricles enlarged, and contained each about ij oz. of clear colourless fluid. Septum lucidum extremely thin and torn towards front part. Substance of brain above ventricle not thicker than the third of an inch.		
48	Male	Very considerable infiltration of pia mater over whole cerebral hemispheres; somewhat increased quantity of fluid in lateral ventricles. Vessels of brain and membranes unusually empty.	A few old adhesions of lungs, but of inconsiderable extent.	Viscera healthy. N.B.—An aneurism of femoral artery, which burst three days before, caused this patient's death.
49	Male	Blood-vessels of brain and membranes larger than natural, but not turgid; considerable serous infiltration of pia mater, and increased quantity of fluid in ventricles.		N.B. — Left thigh-bone dislocated from destruction of the ligaments of hip joint, and was lying on ilium, just above the acetabulum.
50	Male	The hernia cerebri which, during life, had the size of a large hen's egg, was now much shrunk, and it consisted principally of posterior part of left lobe. Two ulcerated openings of dura mater were seen close to posterior part of falx cerebri; one on left side, an inch and a half in diameter, the other smaller; slight adhesion between left cerebral hemisphere and dura mater of vertex. Fluid in lateral ventricles partly purulent, and slight purulent infiltration of choroid plexus. Vessels on surface of lateral ventricles injected. There had been a large exfoliation of the skull, which deficiency was filled up by a dense, thick, and very firm structure, in which the dura mater and external cicatrix were inseparably blended. The external surface of this structure had the character of an ordinary cica-		

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No.	Sex.	Head.	Chest.	Abdomen.
		trix; the interior was the dura mater presenting its usual characters of structure, and smooth surface.		
51	Fem.	Exterior vessels of head completely empty, and not a drop of blood escaped on making the external incisions. All the internal vessels extremely turgid; a little fluid between dura and pia mater; a thin layer of coagulated blood on left side of head covering nearly whole left hemisphere, about an ounce in quantity, but no ruptured vessel could be detected; slight infiltration of pia mater on cerebral hemispheres. Vessels in substance of brain everywhere strongly injected.		
52	Fem.	A considerable quantity of blood escaped on sawing skull-cap. A thin coagulum of blood, about 6 drops, between dura mater and surface of membranes covering right hemisphere near falx. It did not adhere either to dura mater or arachnoid coat; no ruptured vessel was detected. All the internal vessels turgid; numerous and large bloody spots wherever cerebral substance was cut into; considerable serous infiltration of pia mater over cerebral hemispheres; lateral ventricles enlarged and distended by ij or iij oz. of fluid in each cavity; coats of arteries in brain partially thickened and opaque, even in ramifications, but not yet ossified.	Both lungs œdematous; did not collapse when chest was opened; a few ounces of bloody fluid in each pleura. Pericardium closely and universally adherent to heart, the adhesions being of old date. Concentric hypertrophy of left ventricle.	
53	Fem.	Internal blood-vessels of brain generally turgid. Pia mater infiltrated; arachnoid coat slightly and partially opaque; dura mater lined to a considerable extent by an adventitious membrane of tolerably firm and compact structure, of a brownish red colour, owing to minute vessels filled with blood; it adhered to dura mater by short and numerous threads; this membrane was the	Lungs adherent; the adhesions being partial on left, but general on right side. Partial adhesion, of old date, between flat surface of heart and pericardium. Left ventricle of heart large and strong.	

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No.	Sex.	Head.	Chest.	Abdomen.
		thickness of a shilling at its centre, but thinner towards the edges, texture tolerably firm, homogeneous, and of considerable extent. Vessels of cerebral substance were much injected; lateral ventricles enlarged, and each filled with transparent fluid. On under surface of right hemisphere, the remains of a very extensive cerebral hæmorrhage; surface depressed, so as to show loss of substance, and it was of a light ochre tint: neighbouring portion of brain soft, and quite changed in structure. Trunks of large branches of cerebral vessels diseased, the internal coat being also yellow-coloured, thickened, and separating easily from external tunic.		
54	Male	Dura mater adhered to bone so closely, that it was difficult to detach skull cap. Membranes of brain injected; slight infiltration of pia mater.	Lobes of lungs were adherent, and universally agglutinated to bags of pleura by recent inflammation. A large quantity of soft yellow lymph covered opposed surfaces of left lung and pleura. Posterior lobe of left lung showed great vascular congestion, approaching to hepatization, and it sank partially in water. Back of right lung similarly affected, but in a less advanced state. Serous covering of right auricle of heart partially thickened and opaque.	
55	Male	Adhesion of dura mater to skull unusually close. All the blood-vessels of brain and membranes extremely turgid; great infiltration of pia mater; increased quantity of fluid in ventricles, and substance of brain generally rather soft.	Portion of lower lobe of right lung, size of an orange, of a dark liver colour, condensed so as to sink in water, and containing a small abscess in its centre; this part adhered closely to cavity of chest. Portion of lower lobe of left lung similarly affected, but not yet suppurated. A few old adhesions on left side of thorax.	Contents healthy.
56	Male	A very large quantity of blood escaped on opening skull. Blood-vessels of bone, membranes, and brain, all extremely distended; cellular substance of pia mater infiltrated; at least iij oz. of perfectly	Slight adhesions of lungs. Pericardium contained about 2 table spoonfuls of reddish turbid fluid. Heart slightly adherent to pericardium at anterior part of upper surface, adhesions soft. Reflected pericardium inflamed	Lacteal trunks in mesentery filled with chyle. Viscera otherwise healthy.

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No.	Sex.	Head.	Chest.	Abdomen.
		transparent colourless fluid in ventricles; much fluid in basis of skull and round spinal cord after brain was removed. Coats of carotid, vertebral, and basilary arteries thickened by an opaque yellow deposit, but smooth internally; slight partial thickening of arachnoid coat at base of brain.	on upper surface of heart, and over neighbouring part of left ventricle. Membrane red, and presented numerous brightish red spots like ecchymoses. Muscular structure of ventricle had a dull yellowish hue, and apparently free from blood. This change of structure affected whole thickness of ventricle at one point to the size of a shilling, but in rest of its extent, only the internal two-thirds, exterior portion having the normal appearance.	
57	Male	All the vessels of skull, membranes, and brain loaded with blood, of which much escaped during the dissection. Arachnoid coat a little opaque on cerebral hemispheres; cellular texture of pia mater infiltrated; increased quantity of fluid in ventricles; a small quantity, about a tea-spoonful, of recently effused blood between dura and pia mater, near longitudinal sinus on each side, although extended irregularly over a considerable surface; much fluid in basis of skull after brain was removed.	Small effusions of blood, similar in character to those noticed in abdomen, were found in the cavity.	A large ecchymosis in the abdominal parietes between muscles and peritoneum, just above pubes; the blood had been apparently recently effused.
58	Male	All the vessels of head, internal and external, loaded with blood, particularly in those of brain and membranes; blood flowed freely on detaching skull cap from dura mater. Arachnoid surface of dura mater, and arachnoid covering cerebral hemispheres entirely free from moisture; convolutions completely flattened over whole cerebral hemispheres. No effusion of blood in any part of brain, but iij oz. of limpid colourless fluid in each lateral ventricle.	Right lung connected to cavity of chest by general and firm adhesion of old date. Similar adhesions also existed to a considerable extent on left side.	Viscera free from disease.
59	Male	Gangrene of right external ear and caries of bones. Dura mater of a light grey discolouration; extremely fœtid yellowish pus escaped when falx was turned back, and dura mater cut. This membrane and arachnoid	Both lungs connected to the cavities of chest, by firm old adhesions.	

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No.	Sex.	Head.	Chest.	Abdomen.
		intensely and extensively inflamed. (Mr. L. says more than he had ever seen.) Dura mater of right side covered by a stratum of yellow fibrine adhering to membrane and soaked with matter. Diseased appearances most considerable opposite the part where bone was denuded externally. Right hemisphere so changed in structure as to be quite obscured. Middle lobe greatly discoloured, roughened by effused fibrine, and adhered to dura mater. Posterior lobe adherent to tentorium, cortical substance over whole convexity of hemisphere had a dull slate colour. Abundant effusion of pus and fibrine on opposed surfaces of hemispheres, and in intervals between them; evidences of inflammation in dura mater, and arachnoid coat of left side were similar in character, but to less extent; slight effusion of pus and lymph under tentorium.		
60	Male	External vessels of head quite empty; internal all turgid. Arachnoid coat covering hemispheres of cerebrum and pons varolii thickened and opaque; considerable infiltration of pia mater. Water of ventricles slightly increased in quantity.	Posterior lobe of both lungs considerably congested; on left side, the greater part hepatized; partial hepatisation also on the right.	Viscera healthy.
61	Fem.	Considerable quantity of blood escaped during division of external parts and sawing bone. Dura mater covering left hemisphere lined to a considerable extent with a layer of recently coagulated blood, loosely adhering, and about oz. i or more; considerable infiltration of pia mater covering cerebral hemispheres; increased quantity of fluid in ventricles, and much in base of skull when brain was removed.	Both lungs connected to chest universally by firm old adhesions. Congestion and œdema of right lung. Posterior lobe of left lung hepatised and excavated by a large cavern, of which the sides were gangrenous, and exhaled a most offensive fetor.	
32	Fem.	Blood-vessels of brain and membranes injected; slight serous infiltration of pia	Upper half of left lung consolidated and indurated, substance of a whitish grey	Cavity of abdomen contained about 2 pints of thinnish

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No.	Sex.	Head.	Chest.	Abdomen.
		matter covering cerebral hemispheres. N.B. — General emaciation, with slight œdema of lower limbs.	colour; excavated by a large cavern, with irregular sides; this part of lung connected by close and firm adhesions to parietes of chest. Disease of a similar character, but to less extent, in right lung; consolidation in this part by firm whitish grey tubercles of various sizes, and closely arranged; these were excavated by smaller vomicæ.	purulent fluid, discoloured by intestinal contents, and extremely offensive. Viscera connected by recent adhesions into one undistinguishable mass occupying back of cavity, covered by a layer of yellow fibrine; a similar layer lined abdominal parietes, and cavity of pelvis; considerable quantity of yellow fibrine effused in some convolutions of intestines, and in others thick puriform fluid. Blood-vessels of omentum mesentery, and small intestines strongly injected, producing considerable redness in streaks and patches. Mucous membrane of small intestines ulcerated at several points, especially near the termination of ilium, where there was an ulcer about two inches long. Coats of intestine had given way at this part, forming a small opening, through which the intestinal contents escaped.
63	Fem.	Considerable serous infiltration of pia mater on cerebral hemispheres, where some of the convolutions were shrunk, in the velum, about cerebellum and pons varolii.	Left lung closely and universally adherent, consolidated throughout, and excavated by large caverns. Partial disease of a similar character in right lung, which was quite healthy in the intervals of consolidated portion.	Liver considerably enlarged, with hypertrophy of the acini, or "nutmeg liver."
64	Male	Very firm adhesions of dura mater to skull. Blood-vessels of brain and membranes injected; serous infiltration of pia mater, making the membrane one-third of an inch thick, over all the upper part of hemispheres; arachnoid coat thickened and	Both lungs extensively tuberculated, and generally adherent.	Abdomen contained about a quart of dropsical effusion. Numerous ulcers of mucous membrane, both in small and large intestines. In three or four places, ulcerative process

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		opaque, opacity diffused in some parts, in others consisting of numerous closely arranged small spots. Convolutions of hemispheres shrunk.		nearly extended through intestinal tunics; peritoneum had lost its vitality, and would have given way in a short time. Bowels not adherent in these situations. All the mesenteric glands swollen by inflammation. N.B.—Body generally emaciated, the lower extremities swollen from dropsical effusion.
65	Fem.	The external vessels of head completely empty; those of brain and membranes extremely turgid. Serous infiltration of pia mater covering hemispheres.	Extensive old adhesion of both lungs. Anterior lobe of left partially hepatized. Similar affection of posterior lobe of right lung, in a less advanced state.	
66	Male	Considerable serous infiltration of pia mater, much fluid in ventricles, and at base of brain. Cerebellum very soft.	Absorbent glands in chest enlarged, and containing cheesy matter. Right lung considerably tuberculated, and closely connected to cavity by old adhesions. A few grey tubercles scattered through left lung.	Universal peritonitis. Large and small intestines generally agglutinated; much soft yellow lymph effused in the intervals of convolutions; mucous membrane of small intestine ulcerated at several points; one of the ulcers had perforated the serous covering, and thus given rise to the fatal peritonitis. Several of the mesenteric glands considerably enlarged, containing much cheesy matter. Large swelling of right femoral glands.
67	Fem.	Blood-vessels of brain and membranes in the highest state of turgescence throughout. Serous infiltration of pia mater covering cerebral hemispheres. Increased quantity of fluid in lateral ventricles.	Organs free from disease.	Viscera healthy.
68	Male	All the blood-vessels of brain and membranes large and turgid. Orifices of those cut in sections of brain large and numerous in all parts. Serous infiltration of pia	Old and firm adhesion of both lungs, particularly extensive on left side of chest. Active and probably recent inflammation of pericardium; both portions of	The bodies of the three upper lumbar vertebræ enlarged in their anterior surface, presenting considerable irregular

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No.	Sex.	Head.	Chest.	Abdomen.
		mater covering cerebral hemispheres; much fluid on basis of skull after brain was removed.	the membrane covered by a coat of fibrine of variable thickness; loose surface rough and shaggy, easily peeled off from membrane, which was then found thickened, with its surface of a deepish red colour. Over a great portion of left ventricle, heart adhered to the bag. Cavity contained about iij oz. of a dull yellowish turbid fluid. Slight purulent infiltration of cellular texture, external to pericardium, at two or three points. There was an abcess on the external part of chest, towards left side, containing a pint of thick yellow pus; it had existed for some months before death.	protuberances; bone not bare at any point, nor its texture softened. A little purulent infiltration in neighbouring cellular texture.
69	Male	Vessels of brain filled with blood; numerous bloody points on cut surfaces of brain; moderate serous infiltration of pia mater; lateral and third ventricles greatly enlarged, and more than ij oz. of fluid in cavities. Foramen monroeanum large; septum lucidum distended, thinned, and had actually given way at one point, having a few separate shreds, in which individual vessels were seen, the ventricles communicating freely at the intervals of shreds; much fluid in basis of skull after brain was removed.	Right lung adhered strongly and universally to cavity of chest; a vast cavern in upper lobe; entire lower lobe tuberculated and excavated by suppurating cavities throughout. Left lung not adherent, tuberculous masses, from the size of a pea to a gooseberry, but not yet softened, scattered through it; active vascular congestion in these masses and the immediately surrounding pulmonary texture.	Universal adhesions of the several viscera to each other, and to parietes, partly ancient, and partly recent. Peritoneum lining cavity, and covering intestinal canal, and omentum, thickened by an universal tubercular affection; tubercles minute, but crowded into the closest arrangement. Partial firm adhesions of the omentum and other parts to each other, and to the parietes. Universal and recent violent inflammation of peritoneum, with an ulcerated aperture in jejunum, from which the intestinal contents had escaped in small quantity. Convolutions of intestines closely agglutinated; collections of thick puriform fluid on separating the convolutions, and effusions of soft yellow lymph, from the size of a pin's head to a half

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No.	Sex.	Head.	Chest.	Abdomen.
				crown, seen in countless number. Peritoneal covering, both of small and large intestines, deeply discoloured in many parts by intense vascular congestion; that of the mesentery in same state, with mesenteric glands slightly swollen by recent inflammation.
70	Fem.	Bone of the skull had throughout a deepish livid red colour, and adhesion to dura mater unusually firm. Blood-vessels of brain turgid; bloody points on cut surfaces of brain everywhere numerous; moderate serous infiltration of pia mater; and increased quantity of fluid in the lateral ventricles.	Left lung firmly and universally adherent. Pericardium presented marks of recent inflammation in both its portions. Surface of the membrane partially reddened, and in some parts covered by a very thin layer of lymph, which was soft, yellowish, and slightly adherent.	Viscera healthy.
71	Male	Much blood escaped on sawing cranium; vessels of brain and membranes universally turgid, and bloody points on cut surfaces everywhere very numerous; considerable infiltration of pia mater over hemispheres; convolutions on several places shrunk, having intervals occupied by infiltrated membrane, which was distended by a perfectly limpid colourless fluid of watery consistence. Lateral ventricles enlarged, containing an increased quantity of clear fluid. Septum lucidum so extremely thin as to be apparently on the point of giving way at the posterior part. Much fluid in basis of skull after brain was removed.	Right lung connected to the cavity by universal adhesions of the closest and strongest kind. It was filled throughout with small tubercles, which had become softened in several points, and presented small collections of thick yellow matter. When left bag of pleura was opened, a considerable quantity of air escaped from the cavity, and the lung was reduced to less than half its natural size; it was connected to the cavity by small but very firm adhesion of the upper and back part. Pleura lining left cavity slightly thickened, and of a palish pink colour; no lymph effused on the surface, but the cavity contained a small quantity of turbid fluid. This lung was filled with tubercles and cavities like the other, but the opening by which the air had escaped into the chest was not detected. A very small part of the left lung was in a state fit for respiration, although the rest of this and the whole of the right lung appeared solid.	Viscera healthy.

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No.	Sex.	Head.	Chest.	Abdomen.
72	Fem.	Partial serous infiltration of pia mater covering cerebral hemispheres; cerebral vessels not turgid, but bloody points on cut surfaces of brain were more numerous and conspicuous than in a normal state. About i oz. of fluid in basis of skull after the brain was removed.	Acute inflammation of both pleuræ of right side; the surfaces both of cavity and lung covered by recently effused lymph, and partially adherent; several ounces of turbid sero-purulent fluid in the cavity. Recent inflammation of left pleura, with partial effusion of lymph, and two or three points of sero-purulent effusion. The inferior lobe firmly adherent and hepatized, so that it sank in water.	

According to the above statement, it appears, that some pathological changes of structure, more or less evident, were found in the brain or membranes of the whole seventy-two dissections reported, of which it may be stated, as a summary, that 55 cases likewise exhibited diseased alterations of structure of some kind or other in the organs of the chest, whilst only 14 patients showed any morbid appearances in the abdominal viscera. Undoubtedly, this peculiarity may perhaps have been owing to the circumstance, that the abdomen was not opened in every instance, although the presumption is otherwise in the great majority of the cases now detailed.

When compiling the history of the various autopsies contained in the previous synopsis, I ought to mention, as an important feature, that it does not comprise only selected dissections; since the table, in reality, forms a consecutive series of cases, drawn up in the exact order in which they were originally entered on the register of the hospital by Mr. Lawrence; the only two omissions being, the case of a female patient, who died from femoral rupture,

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which contained a portion of small intestine completely mortified, and as black as a coal; and another, where the lungs were extensively diseased. As the brain, in both these patients, was not examined, the accounts are imperfect, and, consequently, the cases have not been included in the list now submitted to the Society, seeing they do not sufficiently bear upon the present discussion to warrant their insertion.

I mention these circumstances, lest it might be thought that the above dissections are brought forward to support a particular theory; there was no such intention; and I would add, that they are now detailed solely as a collection of facts, in order to illustrate the pathology of insanity.

Respecting the seventy-two examinations described in the preceding pages, the following general statement may be given of the pathological changes of structure observed in the head. In 59 cases, there was infiltration of the pia mater. In 59, turgidity of the blood-vessels of the brain and membranes. In 41, effusion of water in the ventricles. In 27, water was met with at the basis of the brain. In 19, bloody points on the cut surfaces of the medullary substance. In 16, thickening and opacity of the arachnoid coat. In 14, the colour of the medullary or cortical substance of the brain was altered from its natural hue to brown, pink, grey, violet, ochre, or white. And in 13 cases, there was an effusion of blood in the brain. Besides these diseased appearances, various other alterations of structure were met with in par-

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ticular patients; such as effusion of pus on the brain; changed consistence of its texture; greater dryness than usual of the membranes; flattening, a shrunk, or a swollen state of the organ itself; with other changes different from a normal condition; for an account of which I would refer to the synopsis, to avoid superfluous repetition.

Although diseased alterations of structure were not so frequently met with in the organs of the chest, as in the brain and its membranes, nevertheless, 55 insane persons in the above list of dissections exhibited changes of a morbid description in the thorax. Indeed, the apparent cause of death, in many of the patients, could be clearly traced to disease in the organs of respiration. Of the 55 instances of pectoral disease met with, on examining the bodies after death, 43 cases showed either recent or old adhesions in the chest, and 31 had the lungs consolidated. In 24, suppuration had commenced. In 15, the pleura or lungs bore marks of recent or previous inflammation. In 12 cases, there was effusion of lymph into the pleura, &c. In 9, considerable effusion into the bronchi and air passages. In 9, the lining membrane of the trachea and bronchi was deep red. In 8, tubercles were met with. In 6, the lungs had assumed a dark, or blackish tint. And in 7, the lungs did not collapse when the chest was opened. Besides these diseased alterations of structure, others were noticed, which it is unnecessary again to particularize, as they are amply described in the previous synopsis.

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Respecting the morbid appearances which the abdominal viscera exhibited on dissection, the instances of diseased alteration of structure in any of the patients were so few, as scarcely to admit of many remarks. However, it is right to state, that the liver was found to be affected in 5 cases; dropsical effusion had taken place in three patients; and in 3 other cases, there appeared decided marks of recent and violent inflammation of the contents of the abdomen; in two of which examples, the intestines had actually given way, so as to allow fæcal matter to escape into the peritoneal cavity; and a similar result would have likely supervened in the other case of intestinal inflammation, had the patient lived for a longer time.

Considering the present communication to have already much exceeded the limits originally proposed, I will not attempt to discuss cursorily the important question which now occupies many pathologists, regarding the rationale of the diseased appearances usually met with in the brains of lunatics on dissection after death, namely, whether the morbid alterations of structure, then observed, be the cause, or only the consequence of the patient's previous mental malady. In short, whether the opinions promulgated by the section of pathological physicians, denominated "the Anatomists," or the views entertained by the other party, "the Vitalists," be the true doctrine. The former considering that the diseased alterations of structure observed in the brain produce the attacks of insanity: whilst the

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latter confidently assert the contrary. I therefore shall leave the decision of such important questions to others more competent than myself to give an opinion; although I must confess, the numerous illustrations now detailed, the facts recorded in medical works, as well as the reasoning of authors upon insanity, greatly preponderate in favour of the Anatomists; whose conclusions, in my judgment at least, appear to be the most rational, and quite consistent with the present state of our pathological knowledge respecting mental diseases.

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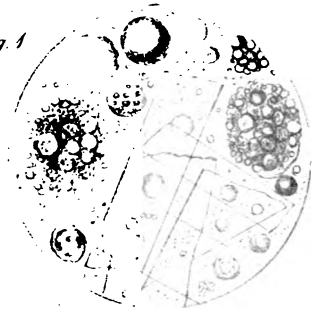
Fig. 1



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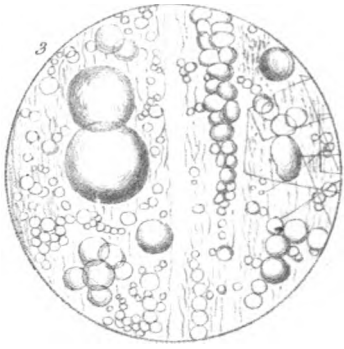

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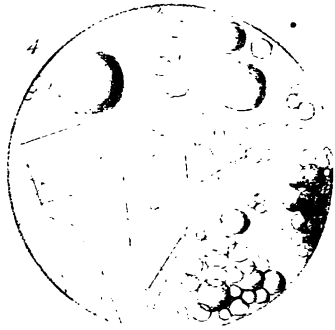

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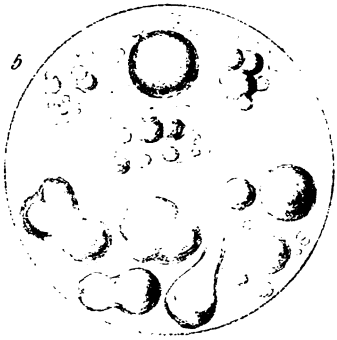

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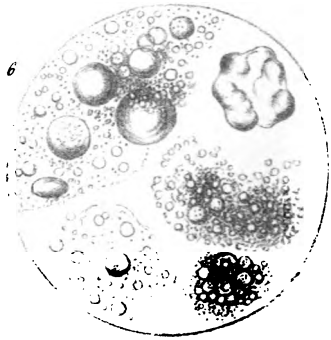

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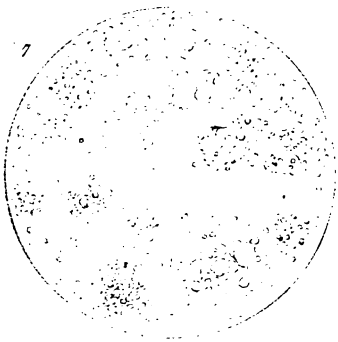

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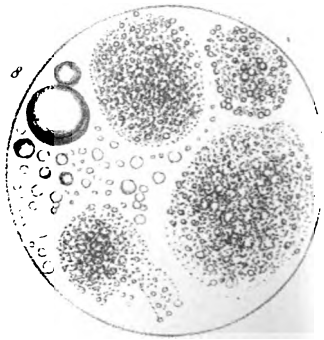

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Fig. 1

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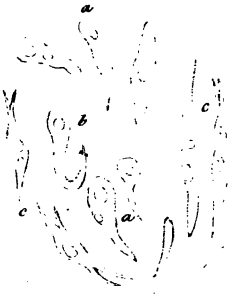

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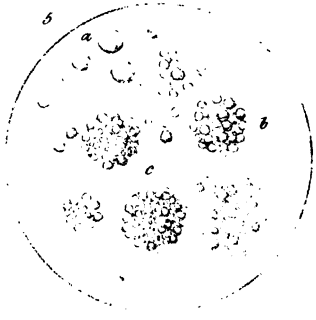

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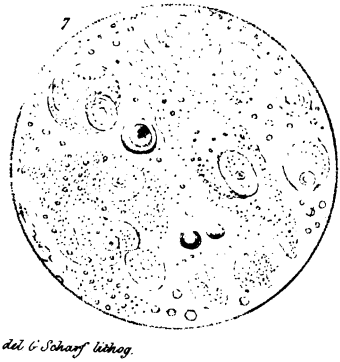

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EXPLANATION OF THE PLATES.

PLATE I.

ILLUSTRATES Mr. Gulliver's paper on Fatty Degeneration of the Arteries, p. 86. A detailed description of the figures is annexed to the paper.

PLATE II.

Referred to in Dr. Hodgkin's paper on the Anatomical Character of some Adventitious Structures, p. 242.

Fig. 1.—Nucleated cells, some containing nuclei, others nucleated cells and nucleoli.

Fig. 2. — Nucleated cells assuming an elongated figure.

a cells simply caudate.

b cell with the pliant caudal extremity bent on itself by movement of the containing fluid or other cause.

c cells prolonged at both extremities, some bifid.

Fig. 3.—Different forms of filamentous matter.

Fig. 4.—Amorphous or granular matter from the breaking up of cells or other sources.

Fig. 5.—Fat globules.

a individual globules of different sizes.

b aggregations of globules of different forms and sizes.

c a globular aggregation of fat globules having the semblance of an envelope.

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Fig. 6.—Crystals of a substance supposed to resemble cholesterine.—N.B. For other representations of this substance, as well as of the fat globules, see the plate illustrative of the valuable paper of G. Gulliver, published in this volume.

Fig. 7.—Drawing of cancerous matter from tubercles in the liver, magnified 410 diameters, by G. Gulliver. It exhibits several forms of the large nucleated cells occurring in malignant structures, which according to careful measurement by G. Gulliver, vary from $\frac{1}{5000}$ to $\frac{1}{800}$ of an inch. Fat globules and granular matter are also represented in this drawing.

Fig. 8.—Development of the ovum after Dr. Barry.
cho. chorion.
f zona pellucida.
b s germ including
b b rudimental embryo.

PLATE III.

Referred to in Mr. Frogley's paper on Osteo-sarcoma of the Thigh Bone, p. 133. It represents a section of the tumour in its recent state, and a cast of the limb after removal. A description of the figures accompanies the plate.

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